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THE UNIVERSITY OF ALBERTA

AN ANALYSIS OF FACTORS INFLUENCING SOCIAL FORESTRY ADOPTION: IMPLICATIONS FOR FORESTRY EXTENSION

BY

JANAKI RAMI REDDY ALAVALAPATI

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

RURAL SOCIOLOGY

DEPARTMENT OF RURAL ECONOMY

EDMONTON, ALBERTA

SPRING, 1990

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The undersigned certify they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled **An Analysis of Factors Influencing Social Forestry Adoption: Implications for Forestry Extension** submitted by Janaki Rami Reddy Alavalapati in partial fulfillment of the requirements for the degree of Master of Science in Rural Sociology.

(D.S. Gill, Supervisor)

(W.E. Phillips)

(W.L. Adamowicz)

(P.J. Murphy)

Date: Dec 8, 1989

Dedicated to my parents

ABSTRACT

This study was conducted in West Godavari district, Andhra Pradesh, India to analyze the factors influencing the adoption of social forestry. The study was designed on the assumption that sociological factors of households and villages influence the adoption process of social forestry. Social forestry was defined with two major components: farm forestry and community forestry and described as an "ecological complex". The diffusion process and social action process were used as frameworks for the adoption of farm forestry and community forestry respectively. Data were collected on both households and villages through a field survey.

The correlation results of the household survey supported the generalizations of diffusion research. In the multiple regression analysis at the awareness stage, respondents' income was not found to be significant but it was a strong determinant of their adoption. At the attitude stage only respondents' awareness of the program, change agent contact, and orientation were significant. Analysis of regional differences revealed that only the Coastal and Upland Regions support the proposition that regions with higher average social, economic, psychological and communication attributes have higher levels of program attributes. The T-test results demonstrated that adopters have higher average sociological factors and program levels than those of non-adopters. However there was no significant difference between home planters and non-adopters with respect to the latter attributes. Results from a village level survey revealed that none of the attributes of village social homogeneity, institutional strength and external integration were associated with the adoption of community forestry. This indicates that no social action took place in establishing community forestry.

The study found that field planters utilize almost all sources of information at the awareness stage but they depend mostly on villagers for technical guidance. The respondents' objectives in growing trees are not consistent with those of the Forest Department. Respondents' main objective is economic returns. Their problems in tree growing and suggestions for improvement indicate that consideration of local needs and local farming systems is essential in designing social forestry programs. It is suggested that target group-specific programs must be undertaken to involve all sectors of the people in social forestry.

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CHAPTER I

INTRODUCTION

Social Forestry in India: A Brief Historical Perspective

The importance of forests and trees to rural people particularly in developing countries, is difficult to overestimate. Forests provide fuel and other goods essential in meeting basic needs of the rural households. Forests also provide food and the environmental stability necessary for continued food production and they generate income and employment in the rural community (FAO, 1978). But factors such as increasing pressure of human and cattle population on the land, expanding population of "slash and burn" farmers, illegal logging and construction of large hydroelectric projects have led to large scale destruction of forests (Biswas and Biswas, 1985; Raiford, 1987). As a result, the signs of socio-economic deterioration have become clearer and it is difficult to ignore them.

Rural dwellers are forced to spend more time searching for fuelwood and fodder. Small timber and building material and other forest related products have become scarce and expensive (Eckholm, 1979). Environmentally, the removal of forest cover has resulted in soil erosion, land slides, desertification, flooding and disruption of water balance (FAO, Undated). It is expected that establishment of village woodlots, afforestation of wastelands, and forest farming will solve many of the problems (Kirchofer and Evans, 1984:2). These activities have been initiated in the name of social forestry, to alleviate the socio-economic problems faced by rural people (Vergara, 1985a). Although the term "social forestry" is relatively new, in the Indian context, the evolution of concerns for social forestry can be traced over a period of hundred years. Shingi et al. (1986) have recently reviewed the historical roots of Indian social forestry programs.

Pre Independence Period

Prior to British rule, for centuries "rural people of India had made use of forestry products according to locally agreed upon practices that ensured their continued supply and distribution" (Shiva et al., 1987:238). The origin of the problem can be traced back to the first Indian Forest Act 1865, which imposed restrictions on the use of forests by local people. These restrictions had far-reaching consequences on agricultural communities, and evoked heavy criticism. Therefore, the revised 1878 Act made a provision for local people to use forest resources and made reference to the formation of village forests.

However, the latter concept was not put into practice because of revenue considerations and absence of recognition of the interrelationships between agriculture and forestry. Only in 1883, Voelcker's report on the improvement of Indian Agriculture had observed the suggestion made by Sir Brandis (the first Inspector General of Forests, India) to form village forests, and emphasized the creation of fuelwood reserves to replace cow dung which was a very valuable manure (Shingi et al., 1986). Further, Forest Policy 1894, for the first time had recognized the necessity of satisfying the local needs and noted the recommendations of Voelcker's report regarding the creation of fuel and fodder resources.

Later on, the Royal Commission on Agriculture 1928 reported that cow dung was the only fuel used by the great majority of cultivators and recommended an enquiry into the economic possibilities of establishing plantations for fuel along canal banks and the margins of rivers and streams. The commission also recommended handing over certain wooded areas to village management and suggested the creation of a special agency to manage minor forests, to give advice and technical assistance to panchayats[1] and cooperative afforestation societies, and to develop the forest resources. Thus the seeds for social forestry were sown by the Royal Commission on Agriculture in 1928.

Post Independence Period

The National Forest Policy 1952, identified the need for ensuring increasing supplies of fodder, small wood for agricultural implements, and firewood as one of the vital national needs. The Policy also pointed out that there was a vast scope for an all-round increase in the area under tree-lands (outside the reserve forests) and envisaged a concerted effort on the part of various government agencies towards planned afforestation (Kondas, 1985).

The First and Second Plan (1951-56 and 1956-61)--The programs of forest development during these plans were mainly the continuation of programs initiated earlier under post-war development schemes. The main feature of these plans was the raising of plantations of timber, match-wood and other woods which had more industrial importance.

The Third Plan (1961-66)--The Third Plan laid emphasis on the productive as well as protective functions of forests to raise the productivity of forests. Besides that, farm forestry and rehabilitation of degraded forests were also considered as important programs. The plan emphasized the development of village forestry to be implemented by the panchayats on a large scale with the forest departments

---

1 Village level self-government, organized on the basis of directly elected councils, established mainly for administrative and developmental purposes.

ensuring supply of seeds and saplings.

The Fourth Plan (1969-74)--In the Fourth Plan developing forests as a support to the rural economy was one of the major objectives. The plan reiterated the earlier concerns of the government that minor forests and pastures must be managed in the interest of the local people. While recognizing the limited success of the past efforts in this direction, this plan emphasized unified action by the forest, revenue, agriculture and animal husbandry departments in cooperation with village panchayats and Zillaparishads[2].

The Fifth Plan (1974-79)--The Fifth Five Year Plan changed the emphasis from conservation oriented forestry to a dynamic program of production forestry to create large-scale man-made forests with the help of institutional finance. Farm forestry and the improvement of degraded forests to increase fuel supply to rural areas came next (Shingi et al., 1986:20). The plan also indicated to raise mixed plantations (multipurpose plantations) on wastelands, community lands and government owned lands on selective basis. The physical and financial details of forestry plantations appears in Table I.1.

Social Forestry in 1980s

National Commission on Agriculture, in 1976, reviewed the history of forest departments before and after independence, the role of forestry in economic development, the previous national forest policies and the forest development under different five year plans. The Commission has realized that "a stage had come when the country could not depend for forest produce on traditional forests only and that extending forest activity outside the forest areas was imperative" (Bachkheti, 1984:16). The Commission dealt with social forestry in detail and stated that one of the main functions of forests would be to meet the basic needs of the community. The Commission's report stressed the socio-economic importance of social forestry in rural communities and stated that

> by taking up the program of raising trees in the village common lands, wastelands, farmers' own unculturable and marginal lands, along canal, road and rail side and in degraded forests close to habitation, would be better for the rural economy and would meet the requirement of rural needs (Tiwari, 1983:4).

The Commission also emphasized the need to strengthen forestry research and education; pricing policies; extension and publicity; and welfare activities.

---

2 A district level local government organized on the basis of directly elected councils. It is in charge of all developmental activities in the district.

TABLE 1.1

PLAN-WISE PROGRESS OF FORESTRY PLANTATIONS

PLAN	INVESTMENT MADE (million rupees)	ACHIEVEMENT (Plantations raised in ha)
1st (1951-56)	1.642	15130
2nd (1956-61)	19.933	147222
3rd (1961-66)	54.305	260315
Post-3rd (1966-69)	42.890	127806
4th (1969-74)	70.670	190280
5th (1974-79)	525.326	567335
Annual Plan (79-80)	226.879	121057
TOTAL	941.645	1429145

Adopted from: Bachkheti, 1984:19 (with modification)

Considering the fact that forests occupy only 22% of the land area of the country (75 million ha), as against the Forest Policy's aim of maintaining one third of the continent under tree cover, an additional 11% (37.5 million ha) needed to be planted (Kondas, 1985). But between 1951 and 1980 only 2.07 million ha. were afforested while deforestation was estimated at over one million ha. annually (Keith, 1986). The consequences of this excessive deforestation have affected the vast majority of rural households in India.

According to the Planning Commission report 1982, fuel wood demand was approximately 133 million tons whereas estimated availability was 39 million tons, leaving a difference of 94 million tons; the estimated fodder demand was about 700 million tons and estimated supply was only 540 million tons (Chowdhry, 1986:2). Keeping in view the fuel and fodder demand and supply position to 2000 A.D. the "Task Force on Taking Forestry to People" (constituted by Government of India in 1980) visualized that organizationally, as well as financially, it would not be feasible for the department to undertake a massive program of afforestation without the active involvement and participation of the people. Further, in 1980s both Government of India and some State Governments considered continuing social forestry programs with the support of foreign aid agencies like World Bank, Swedish International Development

Authority, United States Agency for International Development, Canadian International Development Agency etc. By 1983, programs costing about US $ 345.7 millions were in progress in eight states (Kondas, 1985).

National Wasteland Development Board

The latest impetus for social forestry in India, has come with the Prime Minister Rajiv Gandhi's call while announcing the establishment of Wasteland Development Board, for a halt to deforestation. On January 5 1985, he said

> continuing deforestation has brought us face to face with a major ecological and socio-economic crisis. The trend must be halted. I propose immediately to set up a National Wasteland Development Board with the objective of bringing 5 million hectares of land every year under fuelwood and fodder plantations. We shall develop a people's movement for afforestation (Chowdhry, 1986:2).

Thus social forestry, which was initiated with concerns expressed by a few individuals, had grown and reached a stage of being a full-fledged national program. This brought a necessity for organization and implementation of forestry extension programs to promote and support the development of forestry activities by ensuring people's participation.

The Nature of the Problem

Traditionally, forestry management practices were based on developing an understanding of the protective and productive aspects of natural forests. In this approach only technical and macro-economic considerations received an over riding priority over meeting the local needs. As a result, by and large, forestry programs were developed mostly by government functionaries without consulting the people and ignoring their role in safe-guarding the resources (Rao, 1985). Those programs had seldom encouraged rural people to plant and tend their own trees on a self-help basis. On the contrary, the professional foresters with their trained incapacities[3] had always looked upon the villagers as a big nuisance to forests and never tried to understand their problems. However in recent years there has been increasing appreciation of the direct importance of both forests and trees to rural people (Arnold, 1986). Social forestry programs have been taken up as a holistic approach, with a two pronged objective of arresting the rate of deforestation and bringing a substantial extent of land under tree cover (Sen and Das, 1988). In this new approach, people are the main actors both in planning and implementation of

---

3 "The prejudice of training is always a certain trained incapacity: the more we know about how to do some thing, the harder it is to learn to do it differently" (Kaplan, 1964:31).

forestry programs.

Social forestry offers a new avenue to dealing with widely dispersed, extremely varied and specific needs of people (Foley and Bernard, 1984). It enables people to decide their own priorities, and to grow the types and number of trees they choose in the locations they feel are most relevant to their needs. Further, it also creates an opportunity to breakdown the barriers of mistrust and antagonism which exist between foresters and the public, and enables the resources and expertise of foresters to be utilized and made relevant to the community (Foley and Bernard, 1984). Therefore, social forestry adds a new component to the existing functions of the forestry department which involves a sensitivity to rural development issues (Barnes et al., 1982).

Social forestry helps people meet forest products requirements, improve agricultural production by using trees to control erosion, improve water supply, improve soil fertility, protect crops from wind and frost, and produce shade and forage for livestock (Jordan, 1988; Gregerson, 1988; FAO, Undated). It also helps to enhance the village or rural households' well-being through equitable distribution (Rebugio, 1985a). Moreover, by providing income for farmers and rural communities and by helping them to move from mere subsistence to a better level of living, social forestry is playing a key role in overall rural development (Gregerson, 1988; Barnes et al, 1982; World Bank, 1986).

There is abundant evidence of the appreciation of the potential of social forestry programs in alleviating the problems of rural poor. Many social movements such as "Chipko", "Sarawak" "Amazon Alliance" etc., reveal the growing concerns of people over the relentless destruction of the forests throughout the world. But many studies in India have rated the progress made in social forestry as low and far from satisfactory (Chowdhry, 1983; Shiva et al, 1986; Sen and Das, 1985). Some of the lessons drawn from recent social forestry efforts have shown that their shortcomings are due at least in part to inadequate or inappropriate extension efforts (Falconer, 1987; Sen and Das, 1988).

The assumption that major educational efforts are needed just to convince people that trees are beneficial is rarely justified (Foley and Bernard, 1984). If the people are indifferent or neglectful of the opportunities offered, it is likely that they are constrained by a variety of factors and have more urgent priorities (Keith, 1986). Therefore, what factors are affecting people in adopting tree growing is one of the important issues to be analyzed before designing social forestry programs. As social forestry programs are long term and often complex in nature, if they are to be successful, they need to be integrated into the structural, social, cultural and economic context in which they take place. Therefore, knowledge of

these sociological aspects of both households and villages, is essential to enlisting their successful participation in tree growing programs.

Much of the literature on social forestry has been devoted to a theoretical analysis of various factors which influence tree growing programs. However, there is a limited knowledge gained by practical and field survey research into the manner in which socio-economic, psychological, and communication aspects of households, and various structural and organizational aspects of villages affect the adoption of social forestry programs. There is also inadequate knowledge about the people's perceptions of social forestry which is an essential factor in designing and redesigning appropriate programs.

The Significance of the Problem

There are two basic issues in social forestry: (1) technical and (2) socio-economic. While the technical issue deals with how to change land use patterns so that people get what they need, on the socio-economic side the issue is how to promote local participation in social forestry (Gregerson, 1988). A discussion of technical constraints to social forestry is outside the scope of this thesis. The present study focuses mainly on the socio-economic factors affecting social forestry with a particular emphasis on people's participation in the promotion of tree growing.

A major of social forestry programs in India today is that these programs have failed to muster the common villagers' involvement and that beneficiaries have been largely the big farmers. This view alleges that the poor, as in many other programs, have been by-passed by social forestry programs (Chowdhry, 1986:2-3). Another criticism is that whatever success has been achieved, is concentrated in farm forestry while community forestry has remained mainly as a government program with inadequate local participation. A thorough and detailed study of both households and villages with respect to their social factors and adoption of social forestry may provide insights on the latter criticism.

Most of the farm forestry extension activities[4] were carried out with a great deal of similarity to agricultural extension (Pelinck et al., 1984) which was guided mainly by the "diffusion" model (Contado, 1982:177). The foresters were expected to create a broad range of contacts and to work intensively with interested people (opinion leaders) who would serve as an example for the rest. Many studies have concluded that farmers tend to learn mainly from other farmers who are from similar social and economic backgrounds, and special extension efforts are required for each different socio-economic strata within

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4 In this thesis, the terms forestry development programs, social forestry programs, and forestry extension programs are used interchangeably.

a community (Clark, 1982; Rolling et al., 1976). With regard to community forestry, the forester is expected to facilitate the common consensus and concerted action by the entire community. This means that in addition to the professional and technical tasks, a considerable amount of liaison and educational work with local communities is required. This leads to the conclusion that social forestry is a people-centred enterprise and extension is of vital importance in reaching them (FAO, 1985; Sen and Das, 1987).

In order to make social forestry a success, it is therefore imperative to have an in-depth analysis of socio-economic, psychological, and communication factors at the household level, and structural and organizational factors at the village level. Further, analysis of awareness, attitudes, and the extent of adoption of social forestry are considered essential in designing forestry extension programs. In the past similar studies in agriculture have helped greatly in designing appropriate agricultural extension programs. This study will conceivably provide valuable information and act as a guide in developing suitable strategies for the success of the social forestry programs. The results of the study will also provide feedback to the District Social Forestry Office, West Godavari, Andhra Pradesh on the strengths and weaknesses of the present approach for the purpose of re-orienting and improving present programs and strategies for social forestry development. Herein lies the significance of this study.

Objectives of the Study

The major objective of this study is to analyze the factors influencing the adoption of social forestry in West Godavari district, Andhra Pradesh, India to gain an understanding of the implications of these factors in improving the present or future forestry extension. In order to fulfill this purpose, a number of specific objectives has been established. These objectives are:

1. To find the effect of various socio-economic, psychological, and communication aspects of households on their levels of awareness, attitude and adoption of farm forestry.
2. To analyze the regional differences with respect to socio-economic, psychological, and communication factors of households and their levels of program attributes.
3. To determine the differences between adopters and non-adopters with respect to their socio-economic, psychological, communication attributes and levels of awareness and attitudes toward social forestry.
4. To find the relationship between villages' social homogeneity, organizational strength, and extent of external integration; and the adoption of community forestry.

5. To determine whether the adopters' objectives are consistent with those of planners on social forestry.

6. To study the social forestry related problems of rural people and to record their suggestions for improvement, which may serve as a basis for designing new and specific strategies.

Assumptions

There are a number of assumptions that underlie this research study.

1. The first of these assumptions is that social forestry is an innovation which has been tested for its advantages, and that different techniques are available to suit various ecological/social conditions.

2. The second assumption is that the "diffusion model" is appropriate for studying the adoption of farm forestry while the "social action" process describes community forestry.

3. The third most important assumption is that the differences in levels of awareness, attitude and adoption are attributable to the households' socio-economic, psychological, and communication factors.

4. The fourth assumption is that social forestry programs are undertaken throughout the district with the same intensity.

5. The fifth assumption is that an understanding of the social, economic and psychological aspects of people and social aspects of communities will help foresters in conducting extension activities more effectively.

6. The sixth assumption is that knowledge of the viliagers' perceptions of social forestry can give us some indications which will help in designing appropriate programs.

Limitations

This study is primarily descriptive and exploratory in nature. Its purpose is not to test any set of hypotheses or a specific theory from a given field of inquiry. Rather, the focus is on the factors that influence the adoption process of social forestry with a purpose of gaining an understanding of the implications of these factors in forestry extension. The study of social forestry is primarily interdisciplinary in nature. Therefore, the concepts and principles from different fields of study including forestry, rural sociology, natural resource economics, rural development and psychology have been explored and carefully integrated with a social science emphasis.

As is made clear from the discussion presented under historical background and nature of the problem, the concept of social forestry is relatively new. No studies have been conducted on social forestry in West Godavari district. There is thus a paucity of previously published data available for secondary analysis. Detailed data on community forestry adoption is not available because the relevant government

departments such as Rural Development, Irrigation, Roads and Building, Education etc., which had participated in the promotion of community forestry in recent years did not have updated records. However, concerned village heads, knowledgeables and elders were asked about community planting to cross check the information furnished by the forester and to correct it.

Finally, the scope of this research project is limited by constraints of time and budget. It would have been useful to investigate another district with similar agro-climatic conditions where the program was implemented only recently, to compare the levels of awareness, attitude and adoption and to determine the effect of time in the adoption process. The study is also limited in space. The social and cultural conditions vary from place to place within the state . Therefore, the findings may not be generalized to the whole state. However, for other districts of the same agro-climatic region the present recommendations can be extended by giving allowance for micro and macro variations.

Overview

This study is organized into seven chapters followed by a bibliography and appendices. The first chapter deals with an introduction to the research problem and its significance. The objectives established for the study are discussed, and the underlying assumptions and limitations are stated. The chapter concludes with an outline for the presentation of the thesis. Chapter two presents an overview of the geography, climate and social forestry aspects of Andhra Pradesh state and West Godavari district. Different activities which are taken up under social forestry programs are discussed. The third and fourth chapters provide a review of literature relevant to the concept of social forestry and forestry extension. A theoretical framework is presented for social forestry adoption. Selected concepts from rural sociology are combined with the material on social forestry extension. Chapter five presents the study design and methods employed to collect, analyze, and process the data. The sixth chapter presents an analysis of data and an in-depth discussion of the factors influencing the adoption of social forestry along with the implications. The seventh chapter provides a summary and conclusions of the research results. This chapter concludes with an outline of the manner in which this study has contributed to the knowledge of the subject of social forestry, and finally suggests areas for future research.

CHAPTER II

STUDY SETTING

Andhra Pradesh: An Overview

Andhra Pradesh is the fifth largest and fifth most populous state in India. It is located in the south-east central portion of the Indian sub-continent. Much of the state lies in the Deccan Plateau with the Eastern Ghats extending across the eastern side of the state from north to south. The Godavari, Krishna and Pennar are three main rivers of the state and all flow east into the Bay of Bengal. The state is divided into three distinct socio-cultural regions namely, Telangana, Rayalaseema, and Coastal Andhra. There are twenty three districts in the state. Based on the amount of rainfall received, soil characteristics and crop patterns, these districts are grouped into seven agro-climatic zones as shown in Figure II.1.

The total geographic area of the state is 0.28 million square kilometers. According to 1981 census data, the population of the state is 53.5 million of which 77 percent live in rural areas. The density of the population is 195 persons per square kilometer and the sex ratio (number of females per 1000 males) is 975. The literacy rate of the state is approximately 30 percent with males having about 9 percent higher rate (39.26%) than that of females (20.39%). The Scheduled Castes[1] and Scheduled Tribes constitute 15 and 6 percent of the total population respectively. Agriculture is the major economic activity of the state. Both cultivators and agricultural laborers account for approximately 70 percent of the total main work force of the state.

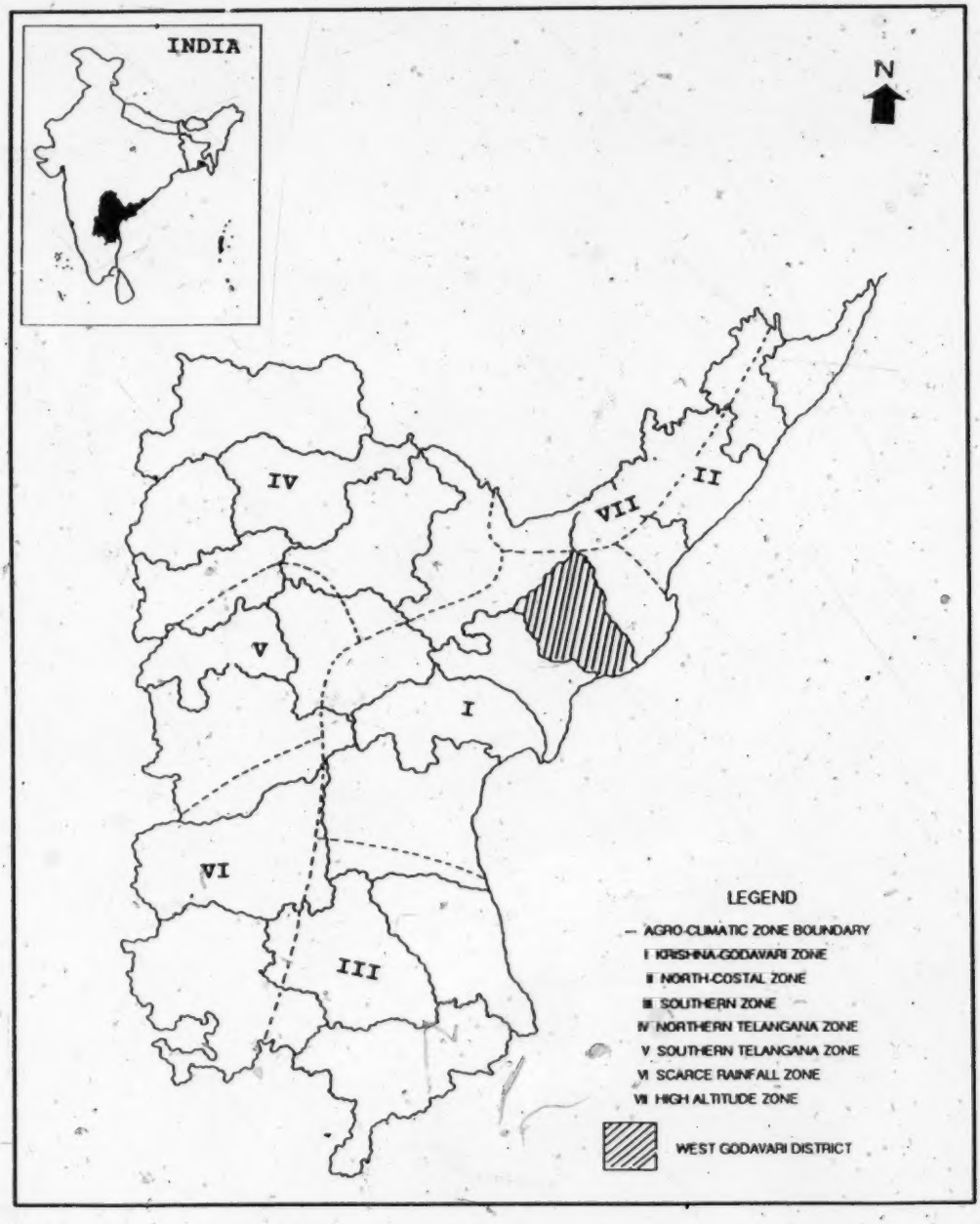
Forestry in Andhra Pradesh

The total forest area of Andhra Pradesh (A.P.), under the control of government is 0.064 million square kilometers. This constitutes 23 percent of the geographical area of the state and works out to 0.12 hectares per capita forest area. The major forest areas are the hilly regions of the Godavari and Krishna river valleys, Eastern Ghats of the north eastern region, and Nallamalai and Yerramalai hills. In the existing 6.4 million ha of forests, the fully stocked (vegetational) area is only about 4 million ha

1 According to the "varna" model they are called as Harijans or Untouchables (Srinivas, 1987). After independence, with a view to improve their well-being, Government of India declared them under scheduled castes and made many reservations in all the developmental activities.

FIGURE II.1

ANDHRA PRADESH



and the balance of 2.4 million ha is either degraded open scrub jungle or denuded and eroded area. Further, from the formation of the state in 1956 to 1984, a total of 0.207 million ha of forest area had been diverted to other land uses (Rao, 1988:11).

Forestry Under Five Year Plans

During the First Five Year Plan (1951-56), the major emphasis of the state forestry was on consolidation of Panchayat and Estate forests and preparation of Working Plans[2]. The Second Plan (1956-61) marked the initiation of soil conservation activities and raising coffee plantations in Araku hills of Eastern Ghats (Shingi et al., 1986). Raising of quick growing species of eucalyptus and bamboo, soil and water conservation schemes, and creation of industrial infrastructure were the highlights of the Third Plan (1961-66). Three annual Plans, Fourth Plan (1969-74) and Fifth Plan (1974-79) emphasized raising plantations on a commercial scale. During these Plans the major investment was on raising plantations of teak (Tectona grandis) and eucalyptus. During the Fifth Plan, a separate institution (A.P. Forest Development Corporation) was established to raise plantations on a commercial scale by drawing finances from various financial institutions. During this Plan, some of the afforestation activities such as shelterbelt plantations in coastal areas, fuel and fodder plantations in drought prone and Tribal areas were also taken up. Only in Sixth Plan (1980-85), emphasis was given to creating wood resources both in public forest areas, and on private agricultural and village/government waste lands. In this Plan, 34 percent of the total outlay (100 million rupees)[3] was allotted towards social forestry activities.

Social Forestry in Andhra Pradesh

The forests in Andhra Pradesh (A.P.) are performing a vital function in meeting the domestic needs of fuelwood, fodder, green manure, small timber and other forest products (mostly through illicit removals). The fuelwood consumption survey indicated that the domestic fuelwood requirement for A.P. was about 15 million tons annually. Out of this, 75 percent of the demand was estimated to be met from agricultural residues, cow dung, or from privately owned tree lands leaving a balance of about 4 million tons of fuelwood needs to be met from public forests. But only about 0.35 million tons of fuelwood was being rendered annually by the Forest Department into the domestic sector (A.P. Forest Department, 1981a).

To bridge the gap between supply and demand of forest products, especially fuelwood, A.P. Forest Department called for a two-pronged approach in late 1970s. One line of action proposed was to continue

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2 A forestry management plan usually written for a forestry division for a period of 10 years.

3 16.852 rupees is equivalent to one U.S dollar as on November 3, 1989.

the reforestation[4] of public degraded forests but with the aim of meeting local requirements of fuelwood, fodder and other forest products. Another was to develop/promote extensive multipurpose wood resources on private, village, and government lands in the name of "social forestry" (A.P. Forest Department, 1981a).

As noted in the discussion in the preceding section, social forestry in A.P. did not make much headway till early 1980s. Only recently, funds from various sources were pooled to organize the activity on a massive scale. Now many developmental schemes have a social forestry component. The schemes which are under implementation with social forestry in A.P. include: National Rural Employment Program (NREP); Rural Fuelwood Plantations (RFWP); Drought Prone Area Program (DPAP); Special Component Plan (SC Plan); Tribal sub-Plan; Shelterbelt Plantations; Watershed Management Plan; and Canadian International Development Agency Social Forestry Project (CIDA). Table II.1 presents the physical achievements of A.P. Social Forestry under different schemes 1987-1988.

CIDA Social Forestry Project

Successful implementation of social forestry requires a steady flow of funds. But with centrally controlled funding, the department has experienced many difficulties particularly when the funds are made available on a year to year basis and for short term relief measures. To alleviate some of these problems in March 1984, the Government of India signed an agreement with the Government of Canada to provide 40 million dollars for the A.P. social forestry project with a loan component of 26.8 million dollars. As per the agreement, CIDA provided funding for 2/3 of the project cost and the State provided the rest. The Government of India has designated the A.P. Forest Department to be the agency responsible for the project implementation and CIDA has appointed Forestal International Limited, Vancouver, Canada as the Canadian Executive Agency (Om Consultants, 1989). The objectives of the project are:

1. to meet the urgent requirement of fuelwood and to provide poles, small timber, fodder, fruits and other minor forest products to the rural populace

4 Reforestation is the establishment of the forests on land which previously carried forests and involves the replacement of the previous crop by a new and essentially different crop (FAO, 1967). Afforestation is the artificial establishment of forests on land which previously did not carry forests (FAO, 1967).

TABLE II.1

A.P. SOCIAL FORESTRY ACHIEVEMENTS To 1987-88

Scheme	Plantation (hectares)	Seedlings Distributed (millions)	Strip Plantation (Kilometers.)
N.R.E.P	28267	356.0	504
R.F.W.P	29348	125.8	-
C.I.D.A.	26183	218.1	3695
D.P.A.P	26003	107.5	1768
Shelterbelts	6007	96.1	42
Tribal Plan	51513	-	-
S.C.Plan	-	72.6	-
TOTAL	167321	976.1	6009

Adopted from A.P.Chief Conservator of Forests Office Records.

2. to induce community participation in creating, maintaining, and protecting the plantation raised under the project so as to share the benefits of the project

3. to provide employment to the unemployed and under employed local people, particularly the landless, including Scheduled Castes and other traditionally weaker sections of the rural communities

4. to generate additional income for the village communities through sale of surplus wood products so that the standard of living increases progressively

5. to help weaker sections of the society (small and marginal farmers) to improve their economic conditions through converting part of their marginal and sub-marginal agricultural holdings to tree farming (A.P.Forest Department, 1981b:IV).

Originally the duration of the project was 5 years with a scheduled completion date of 31.3.1988. For various reasons, the project has been extended for two more years. The project is aimed at establishing 59,000 ha. of plantations and distributing 204.2 million seedlings to the public. The project was implemented in 1983-84 and activities have accelerated since 1985-86. The project made provision for many support activities such as institutional strengthening, extension and publicity, in-service training,

special studies abroad, study tours, monitoring and evaluation, and tree improving activities. The project emphasized the importance of the people's participation in the project by appointing 1200 Village Forest Workers at the rate of one for each mandal[5] to motivate villagers.

State Social Forestry Organization

A full fledged separate social forestry organization has been established by the state as part of the state Forest Department. The organization is headed by a Chief Conservator of Forests, assisted by one Additional Chief Conservator of Forests and one Conservator of Forests. Five Social Forestry Circles were set up comprising 3 to 5 districts, each with one Conservator of Forests for each Circle. Each district is a Social Forestry Division headed by the Divisional Forest Officer. Two additional support services are integrated with this line organization for monitoring, evaluation and publicity, and research and training.

State Social Forestry Committee

To conform with the recommendations of the Government of India's Task force on "Taking Forestry to People", the state government initiated steps to form state and district level Social Forestry Committees. These committees will pool the funds available under various schemes for social forestry, coordinate the social forestry activities of different departments and address problems in implementing the programs. The State Chief Minister is the Chairman of the state level committee, Minister for Forests the Vice-Chairman, and Chief Conservator of Forests the convener of the committee. Ministers for Panchayat Raj, Agriculture, Education, Municipal Administration; Chairman of the A.P. Forest Development Corporation; three Members of Parliament; three MLAs; two progressive farmers; Secretaries of Forests and Rural Development, and Municipal Administration; Chief Engineers of Irrigation, Panchayat Raj, Roads and Buildings; Directors of Agriculture, Animal Husbandry and Paper Mills; and a representative of South Central Railways are the members of the committee. The State Social Forestry Committee will review and approve the district plans for further implementation.

West Godavari District: A Situational Analysis

Geography

West Godavari (W.G.) is one of the districts in Coastal Andhra region of Andhra Pradesh. It is situated to the west of the River Godavari, and runs through the whole length of the river till it flows into the Bay of Bengal. The district lies between 16°-15' and 17°-30' of the Northern latitude and 80°-50'

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5 An administrative and developmental unit. It comprises usually 15-20 villages.

and 81°55' of Eastern longitude. The district was formed on 15 April 1925, when the Krishna district was bifurcated with Machilipatnam as headquarters. Later in 1926, the headquarters of the district was shifted to Eluru. The district occupies an area of 7742 square kilometers and has a population of 2.9 million persons (1981 census data). Based on the soils, irrigation facilities, and administrative structure, the district was divided into three natural regions viz., 1. the Delta, 2. the Upland and 3. the Agency. However, for the present study purpose the Coastal area has been separated from the Delta and treated as "Coastal Region". The Delta Region is characterized by the network of Godavari and Krishna canals irrigation system. The area is highly fertile and agriculturally highly developed in comparison to the other regions of the district. The Upland is an undulating plain that lies between the Delta and Agency Regions. The main sources of irrigation of this region are tanks or tube wells. The Agency Region includes all the villages with predominant tribal populations. The district administration has a special commitment to improve the life of these tribal communities by narrowing the gap between the levels of development of these tribes and others. In 1984, the district was divided into 46 Mandals in place of the previous 16 Blocks with the idea of "taking the administration to the door steps of the poorest of the poor" (Chief Planning Office, 1985-86:5).

Soils

The soils of the district are broadly classified into red sandy loams, sandy clay loams, clays, alluvial, delta alluviums, and arnacious types. The alluvial and delta alluvium soils are highly fertile followed by red sandy loams and sandy clay loams. These soils have good drainage and permeability and are therefore highly suitable for growing a variety of crops. They are greatly responsive to irrigation and fertilizer application.

Climate and Rainfall

As the district adjoins the Bay of Bengal in the southern parts, the sea breeze renders the climate more moderate and tolerable. The average annual rainfall of the district is 1081.7mm. Southwest monsoon (June to September) accounts for 67 percent of the total rainfall while the northeast monsoon (November to December) contributes 24 percent. The district is not normally prone to the threats of drought except in Upland and Agency Regions. In these Regions when monsoons fail or long dry spells during crop season are experienced, drought conditions will prevail as no major irrigation system exists. On the contrary the Delta Region is highly prone to constant threat of floods.

Land Holdings and Land Use Pattern in the District

The distribution of agricultural land is highly skewed towards the medium and large farmers[6]. The marginal and small holdings[7] combined account for 79 percent of the total number of holdings but the area operated by them is only 35 percent. On the other hand 65 percent of the area is operated by medium and large holdings who account for only 21 percent of the total number of holdings.

Out of the 0.770 million hectares of district geographical area, 67.3 percent of the area is available for cultivation compared to 56.7 percent of the state's average. This indicates the high agricultural growth potential of the district. The forest area of the district accounts for 10 percent of the district geographical area. The land put to non agricultural uses accounts for 11 percent of the district area. Only 7 percent of the district area is barren and non arable, mostly in Upland and Agency Regions. The land use patterns vary tremendously across the four regions of the district (Table II.2).

TABLE II.2

LAND USE PATTERN ACROSS THE REGIONS W.G.DISTRICT

REGION	Geographical Area in 000s ha.	Percentage of the Area			
		Net Sown	Forest	Barren Uncult-ivable	Other Uses[8]
Coastal	12.90	53.0	-	6	41
Agency	11.14	16	53.3	12	18.7
Upland	31.15	48	6	10	36
Delta	32.2	71.2	0.5	1.5	26.8

Adopted from: Chief Planning Office Records, W.G. District.

Major Crops of the W.G. District

The district is one of the agriculturally advanced districts in the state where "intensive Agriculture Development Program" is under in implementation. The river Godavari and other hill streams, namely Yerra Kalva, Byneru, Tammileru, Kondakalva and Gunderu, traverse the district, irrigating a large portion of the agricultural land. About 86.3 percent of the agriculturai area is irrigated. Seventy five percent of this irrigation is accounted for by the river canal systems. Based on the nature of irrigation

6 Government of Andhra Pradesh treats land holdings of above 5 acres as large farmers.

7 Land holdings up to one acre are treated as marginal farmers, and up to five acres are treated as small farmers.

8 Include grazing lands, land under tree crops and land under non-agricultural uses.

systems and soil types the crops grown vary slightly across the regions.

Coastal area--This area closely resembles the delta region to the extent of the area irrigated by the canal systems. The chief crops are paddy, coconut, and mango. However, as the area approaches the coast, the soils are sandy and Casuarina equisetifolia is grown extensively. It is a common sight to see Casuarina and coconut trees in home gardens and bund plantings in this area.

Agency area--From the land use pattern table (Table II.2) it is noticed that more than half of the area of this Region is under forests. The villagers of this area depend on these forests for their subsistence needs. Traditionally, they collect honey, gum, nuts and fruits, and other minor forest products from the forest and sell to make living. The main crops of this area are paddy, sorghum, pulses, cashew, mango, peanuts and tobacco. Tanks and tube wells are the main sources of the irrigation of this Region.

Upland area--This Region also lacks the canal irrigation system, and tanks and tube wells are the main sources of irrigation. The soils are mostly ferrugenous in nature. Paddy is the main crop where irrigation is assured. However on all red soils mango and cashew are grown extensively. The A.P. Forest Development Corporation which was established in 1975, started raising plantations (cashew and eucalyptus) commercially on degraded forests. These plantations have motivated many farmers of this region to grow cashew extensively. Besides these crops, sugarcane, banana, tobacco, peanuts, and chillies are grown in this Region.

Delta area--Throughout this region the soils are alluvial and highly fertile. Part of the area on the eastern side of the Region which is closer to Kolleru Lake is subject to flooding causing heavy damage to the agricultural crops. Godavari canal system and Krishna canal system are the main sources of irrigation. The chief crop is paddy. Other main crops are sugarcane, banana, turmeric, and pulses. Coconut is the main tree crop grown in home gardens and bund plantings.

Demography of the W.G. District

As per 1981 census data, the district population is approximately 2.9 millions of which nearly 80 percent live in rural areas. The density of the population is 371 per square kilometer and the sex ratio is 992. Agriculture is the main economic activity in the district. Both cultivators and agricultural laborers contribute 70 percent of the main work force of the district.

The district ranks third in the state's literacy rates. With a rate of 37.6, it is approximately 9 percent higher than that of the state average (29.9%). Literacy rates vary across the regions of the district (Table II.3).

TABLE II.3

LITERACY RATES ACROSS THE REGIONS AND THE DISTRICT

REGION	LITERACY %		COMBINED
	MALES	FEMALES	
Coastal	33.6	19.7	27.0
Agency	29.4	21.2	25.0
Upland	35.0	24.3	30.0
Delta	45.7	33.2	39.4

Social Structure of the W.G. District

As the district is multi caste[9] and multi religion in nature, so are the communities. The district is inhabited by upper castes (Brahmins and Vaisyas), dominant castes[10] (Kapu, Kamma ,Raju, and Reddy), backward castes (Balija, Padmasali, Vadrangi, Kamsali, Golla, Chakali, Mangali, Kummari, Vadde etc.,), Scheduled Castes, and Scheduled Tribes. The Scheduled Castes and Scheduled Tribes constitute 16.1 and 2.3 percent of the total population respectively. Only in Agency Region, the communities are relatively homogeneous with more than 90 percent of the tribal population.

The dominant castes generally have the highest socio-economic status with their large land holdings, sound economic level, and strong political hold. Frequently, factions arise among these dominant castes in holding the formal power in the village. Generally Village Panchayat members (President and ward members) constitute the formal power actors of the community. The Village Panchayat is the major link between the governments and the villagers in promoting the developmental activities. The upper castes still command some respect by virtue of their traditional supremacy in the caste hierarchy. The elders exercise enormous influence within their castes. The dominant castes' leaders therefore maintain close relationships with all castes' leaders to maintain their strength and influence in the community. Both backward castes and scheduled castes seek assistance and advice from the dominant castes on farm and home matters.

Usually the father is the formal decision maker in the house and the eldest son (major) has the most influence on his father's decisions. This was noticed at many instances during the survey in the villages.

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9 Caste is an all-India phenomenon in the sense that there are hereditary, endogamous groups everywhere which form a hierarchy, and that each of these groups has a traditional association with one or two occupations (Srinivas, 1987:3-5).

10 A caste to be dominant, should own a sizable amount of arable land, have strength of numbers, and occupy a high place in the local hierarchy (Srinivas, 1987:10).

Forests and Forestry in W.G. District

The forests in W.G. district are confined to the hill ranges, hills and plains in the northern half of the district. The floristic composition shows considerable variation starting from rich and well stocked forests in the agency area to various types of deciduous forests occurring in the scattered hills and hill ranges all over the upland areas. In the plains the forests are mostly denuded and degraded and tend towards thorny scrubs. According to Champion and Seth's (1968) classification, the forests of W.G.district can be classified into four types namely: Southern moist mixed deciduous forests; Southern dry mixed deciduous forests; Dry deciduous scrub forests; and Tropical evergreen scrub forests. The principal species in the Agency Region are Terminalia tomentosa, Pterocarpus marsupium, Xylia xylocarpa, Lagerstroemia lanceolata, Lagerstroemia parviflora, Chloroxylon swietenia, Anogeissus latifolia, Tectona grandis and others. Species like Lannea grandis, Cleistanthus collinus, Albizzia amara, and Strychnos nuxvomica are predominant in dry deciduous scrub forests which exist in uplands. In upland area where the soil is deep sandy loam, tropical evergreen scrub forests exist with species: Mimusops hexandra, Memecylon edule, Albizzia amara, Maba buxifolia, Diosyrus melanoxylon, Sapindus emarginatus, Cassia fistula, and other Cassia species.

These forests are limited both in extent and produce in meeting the requirements of the district population. Therefore reforestation was begun on degraded forests as early as 1935. But the total area reforested until 1986 was only 7456 hectares.

Social Forestry in W.G. District

By the late 1970s, the government had realized the limited potential of the public forests in meeting the needs of the local people and also the limited capacities of the regular forest department in raising plantations on a large scale. Therefore during 1976-77, the government sanctioned a centrally sponsored scheme with the title: "Raising of Mixed Plantations on Village Wastelands and Tank Foreshore Areas of Panchayat and Revenue Department Under Social Forestry". The objectives of this scheme were as follows:

1. to make the village wastelands, panchayat lands, revenue poromboke lands, and tank foreshore areas productive by growing trees

2. to bring more area under tree cover in order to reduce the ecological imbalances which are already evident

3. to meet the rural people's requirement of fuelwood, fodder, small timber, and other needs

4. to augment the resources of various gram panchayats

5. to provide rural employment through afforestation activities

(Source: Divisional Forest Office Records W.G. District)

In order to achieve these objectives in the district, the government established a separate "Forest Extension Division" with its headquarters at Eluru. This division operated until 1982-83 when the C.I.D.A.-aided social forestry project was introduced in 1983-84.

District Social Forestry Committee

In order to facilitate and coordinate the activities of social forestry in the district and also to approve the district social forestry plans, the District Social Forestry Committee was constituted. The Committee consists of : District Collector (Chairman); Divisional Forest Officer, Social Forestry (Convener); President District Praja Parishad; one local Member of Parliament, three local MLAs, and three Mandal Presidents; District Development Officer, Divisional Forest Officer, Territorial; Project Director District Rural Development Authority; Project Officer, Integrated Tribal Development Agency; Executive Directors Scheduled Castes and Backward Castes Corporation; Joint Director Agriculture; District Panchayat Officer; District Educational Officer; Executive Engineers of Irrigation, Panchayat Raj, and Roads and Buildings; Representatives of Railway Division, and Lead Banks; two progressive farmers interested in social forestry; and representatives of local major forest based industry.

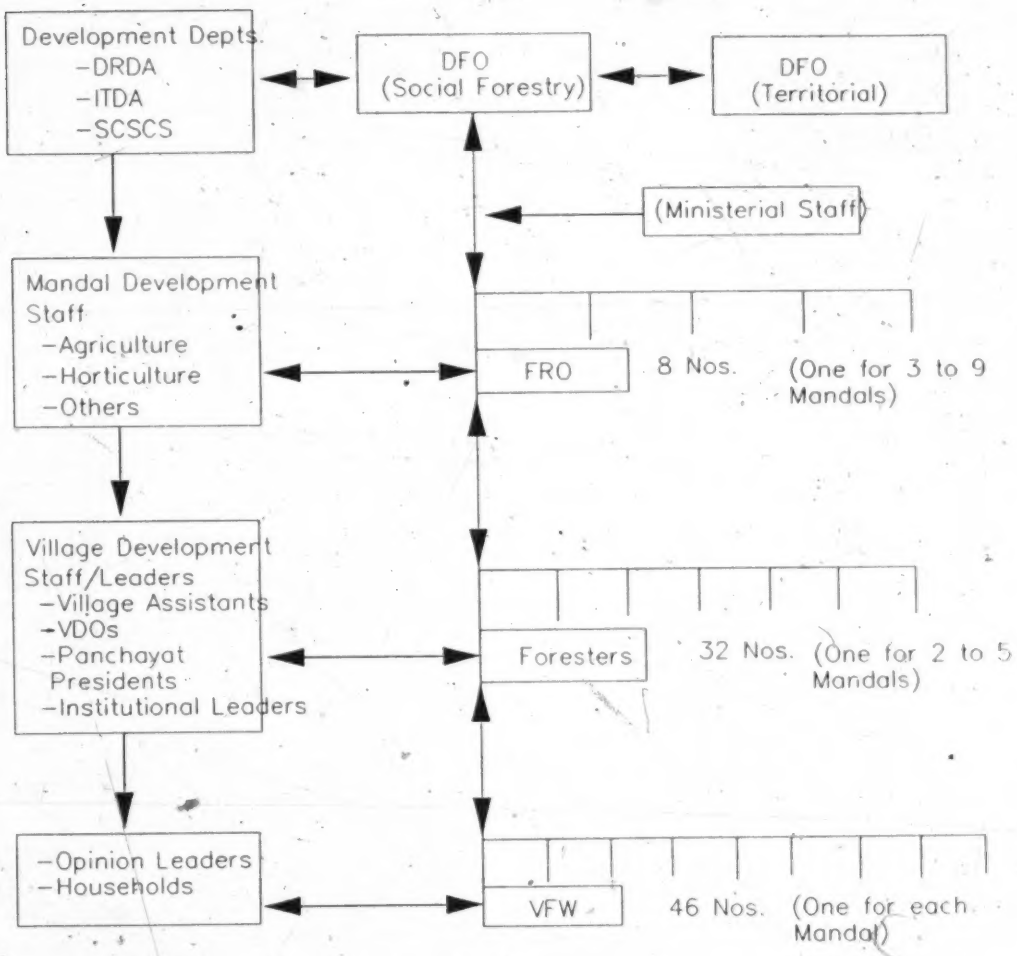
The Committee meets at least twice a year. Generally one meeting is held in February every year to approve the district plans and submit them to the government for sanctioning. The state level Committee approves the plans (by the month of May) well ahead of the planting season (July-September) and communicates to the districts. The subsequent meetings are mostly to review the progress in implementation of the plans and coordinate the activities among various departments.

District Social Forestry Organization

The Divisional Forest Officer (DFO) is the head of the District Social Forestry Organization. As a convener of the District Social Forestry Committee, he/she coordinates the social forestry activities of various departments in the district. The DFO acts as a liaison officer between the Regional and State level units, and the field staff in the district. He/she is being supported by a group of ministerial staff at office, and a well established hierarchical line organization at the field level. There are six Range Officers covering the jurisdiction of the entire district and these in turn are being supported by 32 foresters. At the grass roots there are 46 Village Forest Workers. The Organizational Chart of the District is presented in Figure II.2.

FIGURE II.2

DISTRICT SOCIAL FORESTRY ORGANIZATION



DRDA = District Rural Development Agency
ITDA = Integrated Tribal development Agency
DFO = Divisional Forest Officer
FRO = Forest Range Officer
VDO = Village Development Officer
VFW = Village Forest Worker
SCSCS= Scheduled Castes Service Cooperative Society

Each Village Forest Worker is in charge of one mandal whose work is primarily to motivate people to grow tree crops and give feedback to the Forester and Range Officer on the perceptions of the villagers. He/she works closely with other village officials in developing contacts with villagers. The Forester who

is in charge of 2 to 5 mandals is responsible for the execution of the social forestry activities and extension. The Range Officer who is in charge of 3 to 9 mandals is the head of the field staff and main source of feedback to the Divisional Forest Officer on social forestry activities of his area. He is responsible for mobilizing his staff in executing various social forestry activities and is accountable for the alloted finances. He tours intensively to supervise the work, and extension activities of the Forest Village Worker.

Operational Components of Social Forestry in W.G. District

There are different types of plantations in the district under social forestry which can conveniently be grouped into two broad categories namely "community forestry" and "farm forestry". The first category includes communal plantations; tank foreshore plantations; plantations along road sides, canal banks, railway tracts, and shelterbelt plantations. Tree Patta[11] Plantations; raising of tree nurseries; tree crops on private lands and bunds; tree patta plantations; and home gardens are included under farm forestry.

Communal plantations--Invariably the Conservator of Forests (Regional Officer) decides the technical aspects of the plantation such as species selection, espacement, and other cultural operations. Once the Conservator of Forests approves the district plan, it is communicated to the Divisional Forest Officer (DFO). He/she then issues orders to the Forest Range Officers (FRO) to execute the program. The FRO with the assistance of his foresters and Village Forest Workers will have already localized the village wastelands/panchayat lands/revenue porambokes to raise the suitable forestry species. After receiving the execution orders from the DFO, the FRO contacts the formal leaders of the village (usually panchayat president) or officials of the concerned department (in case of revenue land) to take over the formal possession of the land (in the form of agreement or resolution) to raise the plantations. The details of the scheme including the benefit distribution modalities are explained to the village leaders.

After raising the plantation, a watcher is appointed (invariably from the same village) to protect the plantation. At the end of the third or fourth year (the trees are expected to grow beyond the reach of the cattle damage) the plantation is handed over to the concerned panchayat for further maintenance and protection. An agreement would be made between the department and the panchayat to share the benefits on 50:50 basis at the time of harvest. In this approach villagers' participation is limited to keeping the land in the disposal of foresters and contributing labor for the wages.

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11 The household will have the right to use the usufruct of the tree but not the tree and the land where the tree is grown.

Tank foreshore plantations--The process of raising these plantations is analogous to the communal plantations, but they are limited to the Upland and Agency villages where tanks exist with potential foreshore areas. When water starts receding Babul (Acacia nilotica) seedlings are planted in the foreshore areas (Plate II.1). As these areas are potential grazing grounds, the department will have a greater problem in convincing the people to protect these plantations.

Shelter belt plantations--The concept and philosophy of these plantations is different from those of communal and tank foreshore area plantations. The primary objectives of these plantations are environmental in nature . The communities along the coast get indirect benefits from these plantations such as protection from floods and winds. These plantations are raised mostly in coastal areas and the land invariably belongs to the government. The villagers' participation is limited to paid wage labor and villagers are not entitled to share any direct benefits.

Plantations along road sides, canal banks and railway tracts--In raising these plantations, the Forest Department consults the relevant departments (Roads and Building, Irrigation, and Railways) to obtain their formal consent. As the lands in these types of plantings does not belong to the local communities, the Forest Department generally does not consult them in raising these plantations. Communities will get environmental and wage employment benefits out of these plantations.

Tree patta plantations--The essence of this component lies in the beneficiary's right to enjoy the usufruct of the trees but not the trees and land. It is a program aimed at specific target groups particularly the weaker sections of the society. The tree patta plantations within public forests area are being monitored by the forest department (territorial), and plantations outside the public forest area are looked after by either forest department (social forestry) or other development departments.

Having realized the limitations of the forest department in reforesting the degraded forests and the urgency of reforestation, in 1983, the Government of Andhra Pradesh sanctioned a scheme called "leasing out the degraded forest areas to weaker sections for raising tree crops". Subsequently in 1986, this scheme was renamed as "reforestation of degraded forests with family assistance method" on tree patta basis. Under this scheme, each household is allotted 1.5 ha of degraded forest area each year for a period of five years. The households are selected from the villages close to the forest areas and they belong to Scheduled Castes, Scheduled Tribes, or weaker sections of the village. Both local leaders and village officials are consulted in selecting the prospective households. The household is responsible to raise plantations over 1.5 ha each year, and maintain and protect the plantation until the end of the first

PLATE II.1
TANK FORESHORE PLANTATION WITH ACACIA NILOTICA.

rotation age (five years). The household is paid rupees 300 per month for five years as a subsistence allowance towards his/her raising and maintaining the plantations. At the time of harvest, the revenue is shared on 50:50 basis by the household and the forest department.

Tree Patta Plantations are also being raised along road sides, on canal banks, and along railway tracts as shown in Plate II.2 and II.3. For these plantations also only landless, poor and weaker sections of the communities are considered. Each beneficiary (household) is allotted 100 plants (generally 1/2 kilometer) along the length of roadside/canal bund/railway tract. Initially the department carries out the operations such as digging of pits; planting of seedlings; providing tree guards, manure and cattle proof trench before handing over to the beneficiary for further maintenance. The beneficiary will be paid rupees 300 per month for a period of four years as a subsistence allowance towards his contribution for further maintenance of the plantation. As the species raised are either mango (grafts), or coconut (hybrid) the plantations are expected to yield from the fifth year onwards. The beneficiary will be awarded tree patta at the beginning of the fifth year. It was estimated that each beneficiary may get about rupees 800 per month on average from the usufructs of these trees.

Raising tree nurseries--Raising of nurseries is the major component in social forestry activities. Millions of seedlings are being raised every year to meet the requirement of both community and farm forestry (Plate II.4 and II.5). Although Forest Department (social forestry) is the major contributor of the district target, it is encouraging the weaker sections, schools, and voluntary organizations to raise the seedlings under buy back policy. The department imparts necessary technical expertise to them in raising the nurseries. Mostly the State and Regional level Officers decide the number to be raised and the composition of the species to be maintained. The Range Officer with the assistance of his field staff is responsible for raising the given number of tree seedlings in his area. He in turn fixes the target for each forester to execute the work and closely supervises the progress. Each year about fifty to seventy million seedlings are grown by the department for public distribution. The number of seedlings grown in 1988 are given in Appendix 11.

PLATE II.2
TREE PATTA PLANTATION (ROAD SIDE) WITH MANGIFERA INDICA.

PLATE II.3
TREE PATTA PLANTATION (ROAD SIDE) WITH COCUS NUCIFERA.

PLATE II.4
TREE NURSERY RAISED BY FOREST DEPARTMENT.

PLATE II.5
TREE NURSERY WITH MANGIFERA INDICA SEEDLINGS.

Private plantations and home gardens--The district social forestry organization is specially geared towards this component. The staff keeps the "trickle down" concept in mind and focuses mainly on the progressive farmers by pursuing them to grow tree crops on their lands (Plate II.6 and II.7). In this component all the factors of production come from the individual households and the forest personnel give only the necessary technical guidance in growing tree crops. Special incentives have been provided to the weaker sections, and small and marginal farmers, to involve them in the tree planting program. The seedlings are made available free of cost to the small and marginal farmers, and a nominal price of 0.01 rupee per seedling is being charged to the large farmers. Besides this, some small and marginal farmers are being assisted financially under CIDA project (0.50 rupee per growing seedling).

For all the home gardens the seedlings are being distributed free of cost. The landless and the weaker sections of the communities are specially encouraged to grow home gardens by distributing fruit species along with fuel and fodder species.

Social Forestry Through Other Departments

The Integrated Tribal Development Agency (ITDA) concentrates exclusively in agency area to improve the living standards of the tribal people. The ITDA which has all the important development sectors, has taken up social forestry as one of the developmental tools to improve the tribal economy since 1983-84. ITDA's approach is mainly support service type with substantial financial assistance in the form of subsidies. This agency coordinates its activities with Forest Department for seedlings supply and technical advice.

In order to provide full employment and raise the income level of the target groups among agricultural and non agricultural laborers, small and marginal farmers and artisans, Integrated Rural Development Program was started in the district in 1979. The District Rural Development Agency (DRDA) has taken up social forestry since 1985-86 to alleviate some of the economic problems of the target groups. This agency operates its activities through the mandal development staff and multipurpose village development officers in the entire district. This department also coordinates its programs with Forest Department for required seedlings and technical expertise. The Scheduled Castes Service Cooperative Society (SCSCS) which was started in 1974, has been implementing the social forestry activities exclusively to improve the socio-economic conditions of the Scheduled Castes. This Society mainly assists the S.C. farmers by providing loans with low interest and subsidies for raising tree crops. This society also coordinates with Forest Department for required seedlings and technical expertise.

PLATE II.6
CASUARINA EQUISETIFOLIA PLANTATION AS FARM FORESTRY.

PLATE II.7
EUCALYPTUS TERETICORNIS AS A FIELD BUND PLANTING.

The operational approach of these departments is quite complex. These departments coordinate with Forest Department for logistical support, with banks for finances and with mandal development staff/Non Government organizations (NGOs) for field assistance. Besides these departments, other departments such as irrigation, panchayat, education, etc., have also started growing trees in and around their operational areas. The achievements of the social forestry activities under various components are presented in Table II.4.

TABLE II.4

SOCIAL FORESTRY ACHIEVEMENTS IN WEST GODAVARI DISTRICT TO 1987-88.

TYPE OF PLANTATIONS ON/ALONG	FOREST DEPARTMENT	OTHER DEPARTMENT
Degraded forests	7456 ha	-
Communal lands	944 ha	-
Tree Pattas	30 Km 426 ha	-
Tank Foreshore Areas	548 ha	-
Road Sides	150 Km	-
Canal Banks	67 Km	-
Railway Tracts	60 Km	-
ASM*	108 ha	9179 ha

Adopted from: District Development Office Records, W.G. District.
*Financial Assistance to Small and Marginal Farmers.

Discussion

The primary objective of the discussion thus far is to delineate a number of factors that need to be analyzed in designing and implementing a comprehensive social forestry program in the district. The details of the forest area and its condition will give an indication of design strategies to expand/improve the area under tree cover in order to be consistent with the norms of the National Forest Policy (to maintajn 1/3 of the area under tree cover). As the soils and climatic conditions of the area determine the choice of the species and periods of cultural operations, knowledge of these issues will help design technically sound programs. Knowledge of indigenous farming systems is essential to design location specific social forestry programs.

Community is the medium into which all the development programs are introduced. But the social structure of the community will greatly influence the implementation of these programs. Therefore the knowledge of the local power structure including the local institutions will greatly assist in designing appropriate extension programs and in choosing suitable extension methods.

The discussion about the evolution of the social forestry and constitution of the committees is to analyze the adequacy of political commitment of the government towards social forestry. As social forestry is a multi disciplinary concept, analysis of the organizational structure, its size and its functioning modalities provides an overview of potential problems as well as promises for the successful implementation and coordination of the programs. Finally the details of various operational components and their approaches can be analyzed in a theoretical framework before making necessary changes.

CHAPTER III

SOCIAL FORESTRY: A CONCEPTUAL ANALYSIS

Introduction

For various reasons as explained in Chapter I, during the last decade, social forestry programs have created world wide interest. The Food and Agriculture Organization (FAO) in 1978, published a report on "Forestry for Local Community Development". In the same year World Bank published Forestry Sector Policy Paper emphasizing forestry development programs. Further, VIII and IX World Forestry Congress's themes "Forestry for People" and "Forestry Resources in the Integral Development of Society", reports of the International Development Research Center, and World Resource Institute's report (1985) "Tropical Forest: A call for Action" have greatly helped many developing countries realize the importance of forestry development programs in rural development.

Now many countries across the Third World have realized that emphasis on industrial forestry does not result in meeting the basic needs of the rural people on various forest products. As a result, much attention is now being given to deliberate creation of a dualistic forest economy, in which the emphasis on developing industrial forestry is matched by efforts to develop forestry programs directed to the needs of local people (Hinkeloord, 1984).

These forestry development programs have many names, including social forestry (India), village forestry (Senegal), cooperative forestry (South Korea), agroforestry (Philippines), and fuelwood management (Honduras). The United States Agency for International Development refers to many of these endeavors as farm forestry, while FAO groups all these programs under the title of community forestry (Jordan, 1988:37). Although these terms are often used synonymously and loosely, they are by no means equivalent, since some describe concepts and objectives (Hinkeloord, 1984) while others merely denote techniques of forestation. It is therefore essential to define social forestry and to delineate essential components of social forestry systems at the outset.

Social Forestry Defined

In spite of its worldwide popularity, social forestry as a concept and practice has remained vague to lay persons as well as to forestry professionals who implement social forestry programs (Shah, 1985). By using the phrase "social forestry" for the first time in 1968, the forest scientist Westoby, defined social forestry as "a forestry which aims at producing flow of protection and recreation benefits for the

community" (Tiwari, 1983:13). The FAO (1978:1) has defined community forestry "as any situation which intimately involves local people in a forestry activity". According to the FAO, community forestry embraces a spectrum of situations ranging from woodlots in areas which are short of wood and other forest products for local needs, to growing of trees at the farm level to provide cash crops. It may also include processing of forest products at the household, artisan or small industry level to generate income, as well as the activities of forest dwelling communities. FAO (Undated:8) has further stated that "community forestry departed radically from all previous conceptions of what forestry was about in that it centered on the idea of people's participation". National Commission on Agriculture, India, in 1976 defined social forestry as a concept to deal with sick lands (physically) and sick people (economically) to produce goods such as fuel, fodder, small timber etc., to meet the needs of the local community particularly the underprivileged section (Shah, 1985). Tiwari (1983:7), defined social forestry as:

> the science and art of growing trees and/or other vegetation on all land available and managing the existing forests with intimate involvement of people with a view to provide a wide range of goods and services to the individuals as well as to the society.

Bachkheti (1984:14) defined social forestry as an activity concerned with tree plantation in and around human habitation, the objective being to make available within easy reach the basic needs of the inhabitants with respect to wood, fuel, fruits and fodder and to restore deteriorating ecological balance.

Noronha and Spears (1985:229) have stated that the essence of the social forestry projects lies in the word "social"- that is, the projects serve local needs through the active involvement of the beneficiaries in the design and implementation of the reforestation efforts and the sharing of the forest produce. They differentiate social forestry from conventional forestry by stating that it covers "nonmonetized" sector of the economy, involves direct participation of beneficiaries, and implies different attitudes and skills on the part of foresters who have shed their role as protectors of forests against the people.

Pelinck et al. (1984:3) have described community forestry as an activity of "development of awareness, knowledge and responsibility for forestry in communities that will benefit from the presence of nearby forests and trees". Weirsum (1984:8) refers social forestry "to all professional forestry activities that aim specifically at the participation of the local people in forest management and at the fulfillment of the forest related needs and aspirations of these people". Hadley (1988:205) by naming it extension forestry, has explained it as "an informal, needs oriented educational process, carried out through individual and small group communications, and characterized by audience participation". Foley and

Bernard (1984:13) named it "farm and community forestry" and stated its aim is "to help solve their own wood supply problems, meet their own needs, and preserve the environment in which they live by planting trees on their farms and around their villages".

Cernea (1985:267) stated that social forestry programs "are defined to trigger cultural change in the behavior of large number of people with respect to the planting and protection of trees". To avoid the controversies often generated by attempts at precise definitions, Vergara (1985a:5) has summarized the characteristics of social forestry as follows:

> social forestry is a small-scale land use operation ranging from pure forestry to integrated agroforestry, and planned and implemented by individual farmers or communities to yield products and services for their primary use and benefits. The land use of social forestry projects could be sole-owned, community or clan owned, or government controlled but made accessible to farmers.

Towards an Operational Definition of Social Forestry

By closer examination of these definitions however, it is not difficult to trace the common elements. To form a more comprehensive definition the researcher has summarized the common elements (See Table III.1).

The above definitions reveal that subtle differences exist in their scope, objectives and approaches. For example, National Commission on Agriculture (NCA) (1976) India, specified underprivileged section of the community as the priority target group, while Westoby, Pelinck et al. (1984), focussed on the overall community. Noronha and Spears (1985) restrict their definition to only the forestry activities that cover "non-monetized sector". In many social forestry programs commercial farm forestry is a major component, Gujarat Social Forestry Project (India) being the best example. In their objectives Westoby, NCA (1976) and Bachkheti (1984) limited their definitions to environmental benefits, and fuel, fodder, fruits and small timber availability, whereas FAO's (1978) definition encompassed the whole range of situations from planting trees to processing of forest products, and from subsistence to commercial forestry. In Westoby's, NCA's (1976), and Bachkheti's (1984) definitions "people's participation" was not expressed explicitly and paternalism was implicit in them (..."to make them available" Bachkheti, 1984; "...producing..for the community" Westoby;). In Hadley's (1988), Pelinck et al.'s (1984), and Cernea's (1985) definitions educational approaches were specified to develop awareness and knowledge, and to behavioral change in people.

TABLE III.1

DEFINITIONS OF SOCIAL FORESTRY

AUTHOR	TERM USED	UNDERLYING OBJECTIVE	APPROACH SPECIFIED	TARGET GROUP
Westoby (Tiwari, 1983)	S.F.	Flow of protection and recreation benefits	•	Communities
FAO (1979)	C.F.	Meeting local needs (forest related)	People's Participation	Individuals Communities
NCA 1976 (India)	S.F.	Meeting fuel, fodder, small timber needs	•	Communities (under privileged)
Tiwari (1983)	S.F.	To provide goods and services (forest related)	Intimate involvement of people	People
Bachk- heti (1984)	S.F.	To provide basic needs (forest related) and restore ecological balance	•	People
Pelinck et al. (1984)	C.F.	Provide benefits from forests	Developing awareness, knowledge and responsibility for forestry in communities	Communities
Weirsum (1984)	S.F.	Fulfillment of forest related needs	communities People's participation	Local People
Hadley (1988)	E.F.	Local needs	Educational process	Individuals and Groups
Foley & Bernard (1984)	F.F. & C.F.	Solving wood supply problems and needs of people and environmental protection	Helping people solve their own problems	people
Cernea (1985)	S.F.	Planting and protection of trees	Cultural and behavioral change	People
Noronha & Spears (1985)	S.F.	Serving local needs	Active involvement of people	People
Vergara (1985)	S.F.	Meeting forest related needs and services	Through self-help	People

• People's participation is implicit in the definition
S.F. = Social Forestry; C.F. = Community Forestry;
E.F.= Extension Forestry F.F. = Farm Forestry

Analysis of Table III.1 indicates that the common denominators in all the definitions are: people, their needs, and their participation. It also suggests that social forestry is not just a technique but is also concerned with the process of socio-economic change focussing on continuous participation of people. Based on an understanding of the above definitions and drawing on the literature reviewed, for the

purpose of this study social forestry is defined as an activity of tree growing/harvesting/processing, either exclusively or in combination with food/fodder crops, either individually or communally by involving people with the objective of meeting their subsistence, commercial and environmental needs.

Components of Social Forestry System

From the discussion presented in the preceding pages it is noticed that the terms "community forestry", "farm forestry", and "agroforestry" are often used interchangeably with social forestry. In this section an attempt will be made to argue for "social forestry " as a generic term (Rebugio, 1985a) with two main operational components namely "farm forestry" and "community forestry". Based on the degree of involvement of forestry organization and people, Wiersum (1984) identified four specific situations under social forestry and describes them as follows:

1. participatory forestry: popular participation is encouraged but the responsibility for management still rests with forest officials

2. village forestry: professional foresters may have an advisory role but not an executory one. The planning and execution of forest management is carried out by the villagers

3. community forestry: it is a form of village forestry in which management practices are carried out as a communal effort

4. farmer's forestry: management of tree resources rests with private farmers or households.

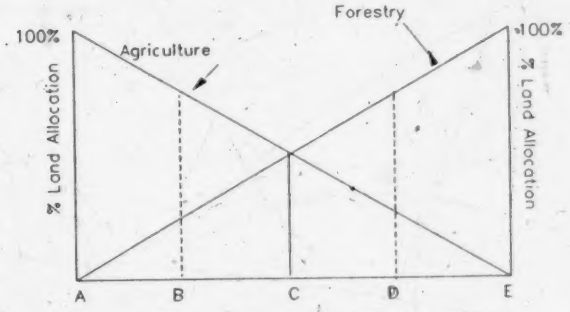
An examination of the above four components indicates that conceptually the first three are the same. All are concerned with community, and the ownership of the resources is vested either with the community or the government but not with the individuals. They differ from each other only in their management styles, particularly in their degree of community involvement. At one end of the spectrum, community is passive, and impetus comes largely from the foresters. On the other end, the level of community participation is higher and the role of foresters is limited to stimulating and facilitating community action. Therefore the first three can be grouped under "community forestry". Rebugio (1985a) describes community forestry as a "community based" social forestry such as communal village woodlots run by panchayats in India and Nepal. He defines farm forestry as "individually or household oriented" social forestry as exemplified by small holder tree farming in Philippines and India. Foley and Bernard (1984) use the term "farm forestry" to describe programs which aim to encourage commercial tree farming by individual farmers on their own private lands, while "community forestry" programs are based on the use of public or communal lands for tree growing by village groups.

In terms of forestry systems practice, both community and farm forestry exhibit a wide range of patterns. They range from pure tree planting on one extreme to the integration of trees with food and/or fodder crops on the other. The latter end of the continuum is mostly referred to as "agroforestry". Spurgeon (1988:44) defines agroforestry as a landuse system and practice in which trees, shrubs, woody perennials are grown in close association with crops and/or animals. From the definition it is clear that "agroforestry" is a technique which can be used both in community and farm forestry (based on the physical and social conditions) to achieve the specified goals.

It is also common to find different terminologies such as "agrisilviculture", "silviagriculture", "silvipasture", "agrisilvipasture", and "silviagripasture" used to describe agroforestry in different regions. But they refer to only different crop components in agroforestry. A closer scrutiny of these terms reveals that a hierarchical order of different components exists in different terms (Vergara, 1984a). For example, agrisilviculture implies that agricultural crops dominate over trees while silviagriculture connotes a relationship inverse to the above as illustrated in Figure III.1.

FIGURE III.1

AGROFORESTRY BASED ON THE AREA ALLOCATION TO CROP COMPONENTS



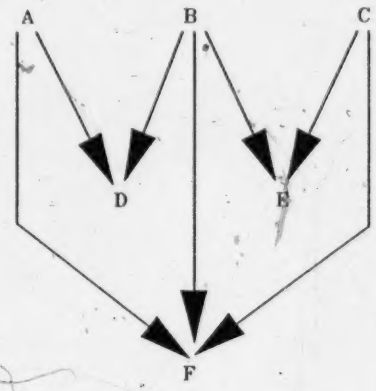
A = Agriculture B = Agrisilviculture D = Silviagriculture E = Forestry

Adopted from: Vergara, 1984a:22 (with modification)

The graph (Figure III.1) is only two dimensional and is limited to an explanation of the integration of individual crops with tree growing. Agroforestry techniques however should encompass multi component situations as stated in the definition. Figure III.2 shows the combination of crops, animals and tree components. This schematic, however, fails to show the degree of dominance of the individual components involved.

FIGURE III.2

AGROFORESTRY UNDER VARIOUS CROP COMPONENT COMBINATIONS



A = Agriculture B = Forestry C = Livestock D = Agrisilviculture
E = Silvipasture F = Agrisilvipasture

In sum, social forestry is a generic term with two operational components namely community forestry and farm forestry. Agroforestry however refers to techniques of growing trees, crops and raising animals in different combinations. Agroforestry is therefore, a means (technology) which can be used both in community and farm forestry to achieve the specified goals. Agrisilviculture and agrisilvipasture techniques are shown in Plate III.1 and Plate III.2 respectively.

PLATE III.1
AGRISILVICULTURE WITH PEANUT AND COCONUT CROP COMBINATION.

PLATE III.2
SMALL FARMER'S AGRISILVIPASTURE
(Peanut is already harvested)

Perspectives on Social Forestry

From the discussion presented in the preceding section, it is clear that the subject matter of social forestry is not limited to any particular field. Instead natural and physical resources, and social factors are closely interrelated. In order to gain an understanding of these factors a sound theoretical base is essential. The theoretical base will provide a conceptual vocabulary and framework to give the scientist a rationale for research (Poston et al., 1984). Several researchers have attempted to provide a theoretical base to social forestry by describing it in a systems perspective (Grandstaff, 1984; Rambo, 1984; Lovelace, 1985; Rebugio, 1985b; Cadelina, 1985; Jones and Prince, 1985; Schmehl, 1986). The systems theory provides a model of the real world and allows its variables to interact (Grandstaff, 1984).

Social Forestry as Resource System

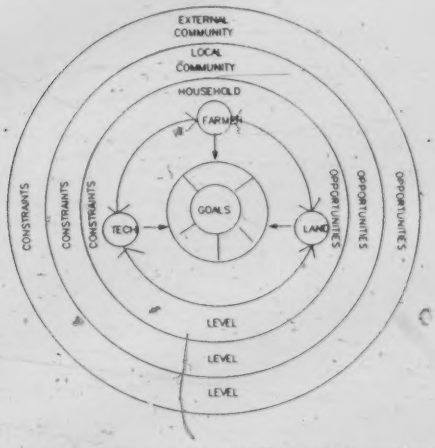
Rebugio (1985) described social forestry as a resource system which includes a set of practices. Each resource practice is basically an interaction of three interdependent elements: land, people, and technology in a particular space and time. He describes land, people and technology as respectively the biophysical, social and technological components of a resource system/practice. The functioning of the system starts with the interaction between the elements and it is influenced not only by the state of those elements but also by biophysical and sociocultural systems.

Even though resource system is a well developed methodological tool for interdisciplinary research it is confined to resource interactions (Grandstaff, 1984:66). Further, by specifying the interaction of three elements spatially and temporally, both permeability and variability of the system (to the other systems) is ignored.

Social Forestry in Cultural Ecology Perspective

Considering the extreme diversity of "social forestry" Cadelina (1985) describes it in a "cultural ecology" framework. He describes the model as an interaction of three variables: farmer, technology, and land/forests at three different levels of social space (Figure III.3). The author argues that farmers' decisions regarding field activities are greatly influenced by the other two variables: technology and land. In other words the type and availability of land, cropping patterns, and other technological inputs/information will determine the decisions of the farmers.

FIGURE III.3
CULTURAL ECOLOGY MODEL OF SOCIAL FORESTRY



Adopted from: Cadelina (1985:244) (with modification)

The other set of factors that influence farmers' decisions are the different levels of social space. As the farmer is a member of a social unit, the immediate social space that influences his/her activities is the household. The household's needs, demographic structure, pattern of arrangements, and its development cycle will affect the farmer's decisions significantly. Secondly, as the household is one of the units of the community structure, community norms, cultural prescriptions, values, expectations, and other structural variables have a direct effect on the farmer's decisions. For example, in a communitarian society social forestry may easily be implemented under communal system (South Korea village woodlots), whereas in communities where land tenure on an individual basis is legalized and stabilized social forestry can be approached on individual basis (Farm forestry in Gujarat, India). The third level of the social space is the external community and larger cultural context. The impact of larger socio-cultural context on local community is not always visible to the household. For example, an understanding of external community i.e state, national, or international social space may be beyond the scope of a farmer or household.

Although Cadelina (1985) made an in depth analysis of constraints and opportunities that affect the farmers' decisions, the elements of the model are not conceptualized clearly. The model focuses

mainly on the impacts of both biophysical and social elements on farmers' decisions. But the issues of how he/she adapts to those changes, and how technology affects environment are not made explicit in the model.

Farming Systems Approach for Social Forestry

Even though there are many studies on "farming systems" in the field of agricultural development, very few studies have been done on social forestry from this perspective. The two main sources used to examine social forestry from a farming systems perspective are Jones and Prince (1985), and Schmehl (1986). Farming systems has been defined "as a unique and reasonably stable arrangement of farming enterprises that the household manages according to well defined practices in response to the physical, biological, and socio-economic environments and in accordance with the household's goals, preferences, and resources" (Shaner et al., 1982:16). By placing emphasis on the use of interdisciplinary team (Schmehl, 1986), farming systems facilitates a better understanding of farmer's motivation for planting trees on farms. It also avoids the structural incompatibilities, by not recommending production techniques which conflict with other farm practices.

In comparision with other perspectives, farming systems is relatively narrow in its scope, and is restricted to the activities that takes place on the farm. Therefore it is "less and less useful at higher levels of analysis" (Grandstaff, 1984:65). Moreover, it is an approach that facilitates the development of technologies appropriate only to the farmers (Garret, 1984). For example, the "Diagnostic and Design (D&D) methodology developed by the International Council for Research in Agroforestry (ICRAF) to design various agroforestry techniques was based on the farming systems approach. So it is appropriate to describe farming systems as a means to develop technology which is one of the three elements both in resource system and cultural ecosystem.

Social Forestry in Human Ecology Perspective

Human ecology is a broad based sociological perspective that evolved from early works of Malthus and Darwin. Albrecht and Murdock (1985:450) state that it is founded on the premise that in order to survive, humans, like other organisms, must adapt to their physical and social environment. This is done by employing technological devices and cultural practices that shape the use of environment and by developing social organizational forms that allow for such adaptation. It is described as an attempt to investigate the process "by which when the biotic balance and the social equilibrium are disturbed, the

transition is made from one relatively stable to another" (Park, 1936:15). Hawley (1950) described human ecology as an adjustment of man to habitat as a process of community development by displaying both symbiotic[1] and commensalistic[2] forms of relationships. Such inclusion of social relationships into the analysis would not only reduce the emphasis on spatial relations but also provide a comprehensive framework with a greater flexibility for community analysis (Murdock and Sulton, 1974).

Rambo (1984) has described social forestry in terms of the human ecology model. In that model, two semi-autonomous subsystems: the natural ecosystem and the human social system, are visualized as interrelated through exchange of energy, materials, and information. Consequently, any change inside either of the two systems may lead to a change in the other subsystem by altering the flow of energy, materials or information. Such changes in the second system can in turn affect the first system through a process of feedback. Thus both systems can be seen as engaged in an endless dialectical relationship and coevolutionary process.

In this study, however, the researcher uses Duncan's (1959) "ecological complex" model as a framework to explain social forestry. This complex has four interactive elements namely (1) population, (2) organization, (3) environment, and (4) technology (often termed as POET variables). The ecological conceptual framework first establishes the functional ecological unit, and examines the key demographic, technological and social organizational details. This model discards the mechanistic assumption of social system that "boundary maintenance" is a necessary condition for system's performance by providing permeability across the boundaries (Kasarda and Bidwell, 1984). As the ecological complex model seeks answers for social changes such as environmental changes and introduction of new technology (Duncan, 1959) it is highly relevant for this study.

The basic concepts and meanings of the "ecological complex" variables (POET variables) are discussed by various authors (Duncan, 1959; Murdock, 1979; Poston et al., (1984)). The researcher briefly summarizes these concepts as follows:

Population--This is the most advanced variable in terms of conceptual and operational details. All demographic research is based on this variable. Population is the unit of analysis in ecology. The

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1 Symbiotic relationships are characteristics of a dependent community represented by corporate groups (such as familial, associational and territorial forms Hawley, 1950:211) which display elaborate division of labor.

2 Commensalistic relationships are the characteristics of an independent community, represented by categoric groups (such as sex groups, occupational groups, social classes) whose main function is to conserve and protect the welfare of its members.

attributes of this variable such as density, growth rate, age, race, sex composition and sociocultural factors may have predictable effects on environment and organizational adaptation of populations (Poston et al., 1984).

Environment--Environment occupies a central position in the framework (Poston et al., 1984). It includes both inorganic and organic environment that affects a population. Lampard (1965:527) describes environment which includes "all the external forces to which a population may be or is responsive and comprises the raw materials of life and the factors that affect the use of such materials including other population". Poston et al. (1984) suggest however to narrow the enquiry in this field to those factors, which serve as limiting resources for the adaptation and/or growth of population in the light of existing technology. In other words environment is viewed as a set of limiting conditions, which may be narrow or broad, depending upon the technological-devices and modes of organization that prevail in a given population (Schnore, 1958:628).

Organization--Social organization is a means of making common response to changing environmental conditions and requirements for system's survival. In other words ecological organization reflects a population's adaptation to the possibilities and limitations of its environment (Poston et al., 1984:95). Berry and Kasarda (1977:14) refer organization to "the entire network of symbiotic and commensalistic relationships that enable a population to sustain itself in its environment". In sum, organization is the adaptation mechanism through which a population is able to cope with environmental or any other social changes.

Technology--Technology is a critical element for the adaptation of human population. Technological innovations are significant factors in the ecological-evolution theory of human societies (Lenski and Lenski, 1987). Technology increases the variety of the ecosystem by facilitating imports into the environment, and by providing a means for reducing the outflow of crucial resources (Stinchcomb, 1983:30). Frisbie and Clarke (1979:593) have summarized various authors' views on technology as follows:

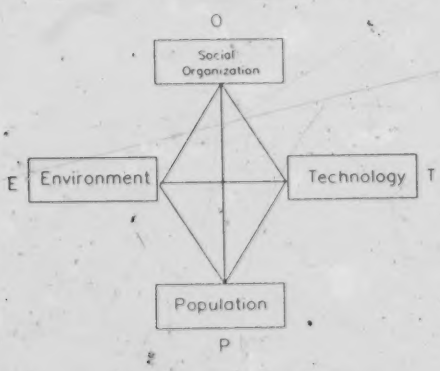
> a fair degree of convergence is evident in efforts to theoretically circumscribe the concept. Lenski (1970:37) defines technology as "the information, techniques, and tools by means of which men utilize the material resources of their environment". Similarly, Sjoberg (1965:214) describes technology as "tools, the sources of energy and the knowledge connected with the use of both tools and energy that a social system employs."..... Finally, Duncan notes that the "concept of 'technology' in human ecology refers not merely to a complex of art and artifact....but to a set of techniques employed by a population to gain sustenance from its environment and to facilitate the organization of sustenance producing activity" (1959:682).

The conceptual analysis of the "ecological complex" will not be completed by merely describing the four elements. But the interrelationship of these elements is the essence of this complex. A change in one element, results in adjustments and changes in each of the other elements. Duncan (1961) has illustrated the interrelationships of the ecological complex with a "smog problem" in Southern California. In the following section the researcher will make an attempt to illustrate the interrelationships of this model with "social forestry".

In the "ecological complex" model presented in Figure III.4, each of the four vertices stands for a collection of analytically distinguishable elements. The lines are meant to suggest the idea of functional interdependence. Although a static equilibrium is seldom observable in the model, it constitutes an equilibrium-seeking system whose path of change has effects upon another in the system (Duncan, 1961).

FIGURE III.4.

ECOLOGICAL COMPLEX



Adopted from: Duncan, 1959:683 (with modification)

Although the model facilitates the discussion at any point, the researcher starts with the relationship between P ⇒ E (Population ⇒ Environment). "By mere occupancy of an environment, as well as by the exploitation of its resources, a human population modifies its environment to a greater or lesser degree, introducing environmental changes" (Duncan, 1959:681). This fact can be traced by analyzing the evolution of human societies from "Hunting and gathering" through "Horticultural" and "Agrarian" to "Industrial" types (see Lenski & Lenski, 1987). The high growth in population has resulted in increased pressure (direct) on the forest resources in the process of meeting their forest related needs.

The traditional cultural practices[3] (shifting cultivation), lack of people's perception of soil conservation practices, organizational priority on economic progress[4] (sizable forest areas were cleared for construction of hydroelectric projects, for raising industrial plantations, and for earning foreign exchange) have not only led to deterioration of the environment but to shrinkage of forest area under tree cover ($T \Rightarrow P \Rightarrow E$; Technology ⇒ Population⇒ Environment; and $O+T+P \Rightarrow E$; O=Organization). The consequences of this process are multifold including soil erosion, floods, droughts (leading to further degradation of environment $E \Rightarrow E$), decline in agricultural production, shortage of fuel/fodder/timber etc., pollution, and greenhouse effect. Thus the population acts upon the environment, the environment reacts upon the population ($E \Rightarrow P$).

Human population is responsive to these environmental changes. Many countries have experienced social movements against the indiscriminate clearing of the forests. For example, in India, the "Chipko Movement 1973" ('Chipko' meaning, hug the tree against felling) arose mainly from the perceptions of people on forests in the ecological context ($P \Rightarrow O$). The latter environmental changes, and the resultant social movements brought pressure on all countries across the world including many international organizations to focus their attention on sustainable development with special emphasis to forestry development. Many international organizations, donor agencies, and national governments have responded highly through their reports, themes, increase in financial aid, and special legislations for forestry development ($O \Rightarrow O$). For example, in Indian context, National Commission of Agriculture 1976's emphasis on social forestry in community development; establishment of separate divisions for social forestry within the forest departments; constitution of State and District Social Forestry Committees; enactment of a special "Forest Conservation Act 1980" (by specifying no forest land should be converted to non forestry purposes until Central Government's permission is accorded); and establishment of National Wasteland Development Board in 1985 are some of the notable organizational responses for forestry development.

These organizations serve as a means to the people to develop and facilite adoption of appropriate technology to cope with the environmental changes ($O \Rightarrow T \Rightarrow P \Rightarrow E$). Many research organizations such as International Council for Research in Agroforestry (Nairobi), International Development Research

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3 The term cultural practices refers to a set of techniques used by farmers/foresters for crops/tree production of which soil management practices are a subset.

4 Goulet (1971), in his "The Cruel Choice" describes the differences between the "economic progress" and "progressive economy".

Center (Canada), and Environment and Policy Institute (Hawaii) focussed their attention on developing suitable technologies. Some of the results of these organizational efforts are improved/fast growing species, effective soil and water conservation practices, various agroforestry techniques, improved woodstoves, biogass plants (O ⇒ T), and forest extension services (O ⇒ O).

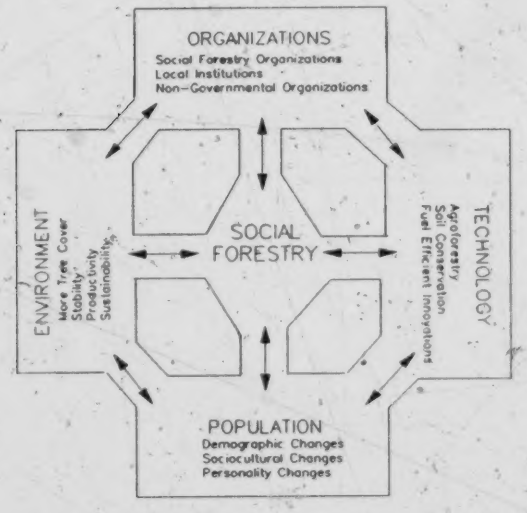
The technology that is developed both indigenously and institutionally will be transferred to the people either directly or through organizations (T⇒ P or T ⇒ O ⇒ P). In this process forestry extension organizations have to play a key role in delivering the inputs and services. So further elobaration/change in organizations is needed (T ⇒O; O ⇒ O). These organizations will focus on changing the perceptions of people on tree growing/exploitation through extension activities (O ⇒ P).

It was already discussed that technology increases the variety of ecosystem and facilitates adaptation process of the population. It is assumed that with the adoption of various agroforestry techniques, soil conservation methods, and fuel efficient innovations, the environment will begin to improve (T+P ⇒ E). This will have consequences again on the population, but those would be just opposite in nature to those first described. In this scenario, floods/droughts have disappeared, soil condition is improved, more land is under tree cover, population has become self sufficient in forest related needs and an overall improvement in the level of living is achieved (E⇒P). With this improvement in environment and the resultant positive effects on people, other adaptive mechanisms will become necessary. For example, forest farmers will form into "forest cooperatives" in order to ensure the market for their forest products (Village Forest Associations in South Korea; Forest Marketing Committees in West Bengal, India;) (P ⇒O). Then in order to assure a market for forest products, special technologies have to be designed such as paper mills, fiber factories, or other wood based industries (O ⇒ T) which in turn may have influences on both population and environment. So the process is not a state of static equilibrium but a continuing dynamic process. A Social Forestry Ecological Complex with an improved situation may look like the one presented in Figure III.5.

The unique feature of this model lies in its scope and flexibility. It can be applied at any level (a community; a district; a state; or a nation) and to any situation (farming; forestry; or any resource practice). Nevertheless it is important to note that the elements of the model do not constitute individual homogeneous blocks. Instead many conflicting and competing forces would be working within each element. For example, some individuals may plant trees others not; some organizations would evince

FIGURE III 5

SOCIAL FORESTRY ECOLOGICAL COMPLEX



more interest on environmental stability while others may favour short term benefits; similarly one type of technology may improve the environment and the other may have the opposite effect. So the model does not always work in the way described thus far.

Summary

In spite of social forestry's world wide popularity, its concept and terminology is vague and not understood by many, including foresters. By reviewing various definitions given by various authors and organizations, and drawing from the literature reviewed, the researcher has provided an operational definition for social forestry for this study. By analyzing various components under social forestry, the researcher argued that any situation can be explained under two components namely farm forestry and community forestry. It is argued that agroforestry is only a technique which can be used in social forestry to achieve specific goals. Finally, various perspectives used to explain social forestry, are reviewed. Out of all the approaches, Human Ecology Approach provides a more comprehensive framework. Duncan's (1959) "ecological complex" was chosen to explain social forestry. The next chapter focuses on how the population gains knowledge of social forestry and adopts it to cope with the changes in the environment, and how organizations will facilitate the adoption process.

CHAPTER IV

ANALYSIS OF SOCIAL FORESTRY ADOPTION PROCESS

The literature search on social forestry indicates that many authors (Agarwal, 1986; Barnes et al., 1982; Raintree, 1983; and Evans, 1988) have either explicitly or implicitly argued that "diffusion of innovations" provides an adequate framework for analyzing the adoption process of social forestry in rural communities. In this study, the diffusion process (where an individual household makes decisions that are independent of the decisions of the members of the system) is used to explain farm forestry. With regard to community forestry, seeking a common consensus among the members of the community is a basic issue. Therefore social action process or collective action process is described to study community forestry adoption process. In this chapter, based on the discussion of the latter two processes, a conceptual model is formulated to describe social forestry adoption process. Various extension related issues which influence the adoption process are also discussed.

Diffusion of Innovations

The adoption of innovations has been the subject of extensive research over the past thirty years. A widely used theoretical framework is that proposed by E.M. Rogers in his Diffusion of Innovation Theory. Evans (1988:46) remarked that "this theory summarizes much of the past and current literature on the diffusion of innovations". Katz et al. (1963:237) defined the process of diffusion "as the (1) acceptance, (2) over time, (3) of some specific item, an idea or practice, (4) by individuals, groups or other adopting units, linked to (5) specific channels of communication, (6) to social structure, and (7) to a given system of values, or culture". Rogers (1983:5) defined this in a more simplistic way as "the process by which an **innovation** is **communicated** through certain channels over **time** among the members of a **social system**". Much has been written about these elements elsewhere but this study focuses on two elements: innovation and time dimensions.

Innovation

"An innovation is an idea, practice, or object perceived as new by an individual or other unit of adoption" (Rogers, 1983:11). It is more dynamic involving a continuity of inventive activity which modifies and adopts the innovation to meet the needs of different groups of adopters (Brown, 1981; Evans, 1988). It matters little whether or not an idea is "objectively" new, but the perceived newness of the idea is the focal point. The research on diffusion shows that different attributes of innovation, as

perceived by individuals, will help to explain the rate of adoption. Fliegel and Kivlin (1966) identified fifteen attributes of innovation to explore their accountability in the rate of adoption. Rogers and Shoemaker (1971) summarized these into a list of five attributes (Table IV.1).

Generally, most extension workers have the opinion that people in developing countries are tradition-bound and opposed to innovations. Many studies have suggested that rural people are responsive to economic incentives but tend to avoid taking risk. Therefore, innovations which are perceived as culturally compatible, rewarding and least risky are accepted more quickly (Fliegel and Kivlin, 1966; Katz et al., 1963). A case study in Guayabi region of Eastern Paraguay by Evans (1988) supported this proposition. He concluded that success of agroforestry was mainly because the innovation was ecologically adaptable, more economical, and compatible with local agricultural practices. In this study it is assumed that social forestry program has all the characteristics that are listed in Table IV.1.

TABLE IV.1

CHARACTERISTICS OF INNOVATION WHICH INFLUENCE RATE OF ADOPTION

CHARACTERISTIC	MEASUREMENT	NOTES
1. Relative Advantage	The degree to which an innovation is perceived as better than the idea it supersedes.	The new idea needs to provide gain in: - economics, - prestige, - convenience, - satisfaction.
2. Compatibility	The degree to which an innovation is perceived as being consistent with: - existing values, - past experiences, - needs of potential adopters.	May require adoption of a new value system prior to adoption of an incompatible innovation.
3. Complexity	The degree to which an innovation is perceived as difficult to understand and use.	The simpler the idea to understand, the more easily adopted.
4. Trialability	The degree to which an innovation may be experimented with on a limited basis.	Innovations which can be tried on an installment plan are more quickly adopted.
5. Observability	The degree to which the results of an innovation are visible to others.	The easier the results of an innovation are to see, the more likely it is to be adopted.

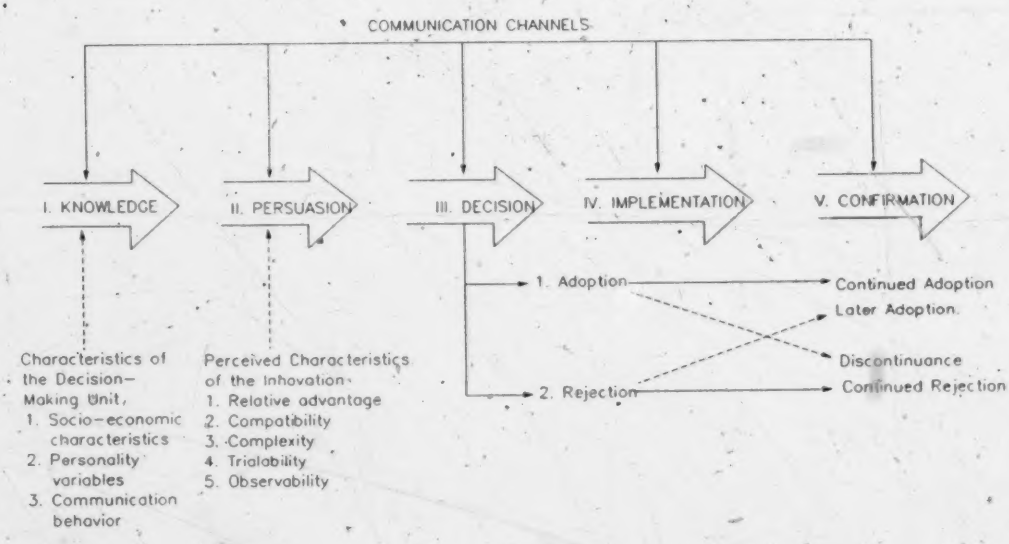
Adopted from: Evans, 1988:47 (with modifications)

Innovation-Decision Process

Innovation-Decision is the mental process through which an individual or the decision making unit passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirm this decision (Rogers, 1983). A model showing the stages of innovation-decision process is presented in Figure IV.1. This process consists of five sequential stages namely: knowledge, persuasion, decision, implementation, and confirmation.

FIGURE IV.1

STAGES IN THE INNOVATION-DECISION PROCESS



Adopted from: Rogers et al., 1988:307 (with modification)

Knowledge--This stage commences when the decision making unit is exposed to the innovation's existence and gains an understanding of how it functions. The household may become aware of innovations by efforts of change agencies, media or by accident. They may expose themselves to innovations in accordance with their needs or interests. In either case the household tries to interpret these innovations in terms of their needs, attitudes, and beliefs (Hassinger in Rogers, 1983). According to this selective perception, needs must precede innovation to motivate people to undertake activities to meet those needs. On the other hand, other authors have argued that innovations or change agents may create needs among the clients. The forestry extension workers use mostly the latter perception, by

assuming that creating awareness of the existence of social forestry program among the people can generate motivation for its adoption. However, as social forestry is a complex process, knowledge of correct forestry practices is essential in the later stages of the decision process.

Persuasion--This is the stage wherein the household forms a favorable attitude toward the innovation (Rogers, 1983). Behaviors such as where the household decision makers seek information, how this information is interpreted and how it applies to their present or future situation, are critical in developing the attitude toward the innovation.

Decision--This stage occurs when the household engages in activities that lead to the adoption or rejection of the innovation. Diffusion research says that decision-making units who try the innovation and perceive some degree of relative advantage will move to the adoption decision. But in the case of social forestry, because of its long term nature, perceiving its advantages in all respects is not always possible before the respondents make decisions.

Implementation--This stage occurs when a household puts an innovation into use. Until this stage, the innovation-decision process has been a strictly mental and intellectual exercise. A certain degree of uncertainty about the expected consequences of the innovation still exist for the individual at the implementation stage, even though the decision to adopt has been made previously. So at this stage, the household wants to know more about the source and availability of the innovation, and other operational aspects. Therefore the role of change agents is mainly to provide technical assistance and resources (if available) to the client before he/she begins to implement the innovation.

Confirmation-- In this stage, the household seeks reinforcement for the innovation-decision already made. At this stage change agent's support messages to the adopters are crucial in reinforcing the previous decisions.

Innovativeness and Adopter Categories

Innovativeness is the degree to which a household or other decision making unit is relatively earlier in adopting new ideas than the other members of a system (Rogers and Shoemaker, 1971). Diffusion of innovation follows a normal, bell-shaped curve or an S-shaped curve when adopters are plotted on a frequency basis or cumulative frequency basis respectively against time. Based on the innovativeness of the individual or any decision making unit, the diffusion studies on agricultural practices grouped farm populations into five categories namely: innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%), and laggards (16%). Reviewing studies in diffusion research, Rogers and Shoemaker have generalized that earlier knowers/adopters of an innovation, when compared to later

knowers/adopters, are characterized by more education, higher social status, more wealth, greater exposure to mass media, greater change agent contact, greater social participation and more cosmopoliteness. The generalized characteristics of these adopter categories are summarized in Table IV.2.

TABLE IV.2

CHARACTERISTICS OF ADOPTER CATEGORIES

CHARAC-TERISTIC	INNOVA-TORS	EARLY ADOPTERS	EARLY MAJORITY	LATE MAJORITY	LAGGARDS
1. Time of adoption	first 2.5 percent to adopt new ideas	Next 13.5 percent to adopt	Next 34 percent to adopt	Next 34 percent to adopt	Last 16 percent to adopt
2. Attitudes and values	Scientific and venturesome	Progressive	More conservative and traditional	Skeptical of new ideas	Conservative beliefs; fear of debt
3. Education and abilities	High level of education; ability to deal with abstractions	Above average education	Slightly above average education	Slightly below average education	Low level of education; difficulty in dealing with abstractions
4. Group memberships and external contact	Leaders in country wide or state organizations; travel widely	Leaders in local organizations	Many informal contacts within the community	Little travel out of community; little activity in formal organizations	Few memberships in formal organizations other than church; semi-isolates
5.Social status	Highest social status, but their farming practices are not respected locally	High social status; neighbours regards as "good" farmer	About average social status	About average social status	Lowest social status
6. Farm businesses	Largest, most specialized, and most efficient	Large farms; slightly less specializedand efficient	Slightly larger than average size farms	Slightly smaller than average sized farms	Small farms; low incomes; seldom farm owners
7. Main sources of in formation about innovations	Scientists; other innovators; research bulletins; change agency	Highest contact with local change agents; farm magazines; extension bulletins	Farm magazines; friends and neighbours	Friends and neighbours	Mainly friends and neighbours; radio farm shows

Adopted from: Rogers et al., 1988:309 (with modification)

From Table IV.2, it is noticed that various social, personal, and communication characteristics of the household will largely influence his/her adoption process. Many diffusion studies have indicated that socio-economic status and innovativeness go hand in hand. This is due to the fact that greatest profits go to those who are the first to adopt; therefore, the innovator gains a financial advantage through his/her adoption behavior. Further, some innovations are costly to adopt and require large initial outlays of

capital. Only the wealthy units in a village may be able to adopt these innovations. So in this process there is every possibility that innovators become richer and the laggards become relatively poorer.

With regard to personality variables, it is generalized that earlier knowers/adopters have more achievement orientation, higher aspirations, higher rationality and are less fatalistic than later knowers/adopters. The communication behavior of the earlier knowers/adopters will also largely differ from that of later knowers/adopters. The former category will have more contacts with external society, more change agent contacts, and greater exposure to mass media than the latter category. These general characteristics of adopter categories will have implications in designing extension strategies. The change agents should use specific communication strategies to reach specific target groups to ensure participation. For example, in a field experiment conducted by Roling et al. (1976) in Kenya, 308 "laggards" were invited to participate in a series of local training courses and were taught about the innovation. When they were provided with agricultural credit, 90 percent of them adopted the innovation.

Social Action Process[1]

Social action can be defined "as the adoption of an innovation by a collectivity in which the decision to adopt is made jointly by the system's members and the actual use of the innovation involves joint efforts by the members of the system" (Rahim in West, 1983:45). All social action takes place in some sort of social system[2], starts with an idea, and goes through certain specified steps before the action is finally implemented. In this section a brief discussion is provided about the process of social action.

Initiating the Problem

Quite often there may be a feeling on the part of people within the village (commonly called "initiating set") that a need exists and it is important enough for them to try to get something done about it. However, there may be some kind of force from outside of the system (such as change agency) that tries to get action started on a given need within the system. Whatever may be the origin, convergence of interest around the need by community members is the initial step toward social action.

Legitimizing the Problem

This is the process of giving sanction by key persons or key groups which then leads to public acceptance of an idea or need. In almost every community there are certain people whose approval or

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1 In this study both social action terms, and collective adoption or collective action are used synonymously.

2 A social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal (Rogers, 1983:24).

acceptance of proposed actions is necessary to make things legitimate (Powers, 1965; Sofranko, 1984). They have a reputation for doing things that are good for the community. By-passing these legitimizers usually ends in failure of social action programs.

Implementation

Once the idea has been legitimized, a set of leaders who should be recognized by the public as action leaders will take the program to the public (diffusion set)[3]. This diffusion set makes the problem become the people's problem[4] and ensures their commitment to action. When the needs are established, the goals are to be set and the means to accomplish those goals are to be determined. A detailed plan of work has to be prepared specifying the time schedules, forming committees and their duties, identifying the resources required, and initiating communication networks to implement the program. Then the program is launched with a big event so that people will know that they are in the action stage. It is important to have an evaluation at each step of the process as well as a final evaluation of the program.

Factors That Influence the Social Action

The social action process will not go as smoothly as described above especially in developing countries. Many factors at village level may influence the collective adoption process. Factors which are ecological, structural, organizational, and communication in nature will largely influence the productive forms of natural resource practices such as community forestry (West, 1983; Baker, 1989). However in this study, the ecological factors are being controlled by assuming that different[5] agroforestry practices exist to suit the different ecological conditions. Therefore it can be stated that adoption of community forestry by the village will largely be determined by its structural, organizational, and communication factors. Conclusions drawn from the studies on adoption of community forestry (West, 1983; Noronah, 1981; Baker, 1989) and on community growth (Young and Young, 1962), indicate that less stratified and relatively more homogeneous village (with relatively less wealth inequality), with greater institutional strength, and with more integration to the external society will more likely and more quickly adopt community forestry than the communities which rate lower on these sociological characteristics.

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3 Usually they have "ability" as salesmen, the "showmanship" of an advertising man, the "zeal" of missionary, and the "dedication" of an educator (Case and Hoffman, 1967).

4 This can be done through basic education, program development committees, exploiting crises, demonstrations, and surveys.

5 For example, in this study the coastal region has good potential for shelterbelt plantations along the coast, while delta region has tremendous scope for bund planting.

Social homogeneity--A degree of homogeneity within the community will greatly facilitate managing a common property resource (Ostrum, 1985). Mobilization potential will be greater if the community is composed of homogeneous categories rather than of heterogeneous groups (Baker, 1989). Based on their analysis of a small German town, Laumann and Pappi also stated that in communities where population is more homogeneous, there will be fewer local factions. Hence collective decisions will be more easily achieved. Supporting this theory, many studies have attributed the success of village afforestation programs in South Korea to the greater homogeneity of the villages, and relative equality among the user groups. At the same time the heterogeneous nature of villages, and presence of powerful factions in villages were identified as the main reasons for limited success of community forestry in Gujarat, India (Noronah, 1981). Factions along castes or ethnic lines, or economic lines complicate the adoption of collective programs in the rural areas. As collective adoptions of natural resource programs have implications for change in power structures, resource distribution and prestige among factions, this may lead to strong resistance to adoption of planned activities (West, 1983:51) such as community forestry. In communities where disparities in landownership and power are great, the attempts to achieve collective adoption may be doomed to failure (Uphoff and Esmann, 1974:64-66). In this situation, the alternative strategy would be to work with the sub-units of relatively homogeneous strata within the community rather than with the community as a whole (West, 1983).

Organizational infrastructnure--It is an important structural prerequisite for collective action. Organization is "a channel that the rural poor can use to demand better services and more relevant and responsive policies from those who control the resources that they need" (Esman, 1984:104). Organization enables a group to commit resources and cooperate in the pursuit of common goals (Baker, 1989:4). Therefore collective actions such as community fuelwood lots, virtually necessitate investment in at least some degree of community organization (Coward, 1977). Baker (1989) asserted from his study of social forestry in Chotanagpur (India), that the presence of local organizations is a good predictor of the presence of community forestry. However studies on community forestry in Nepal and village afforestation in Korea indicate that special organizations such as Village Forest Associations that are developed for the promotion of community forestry, have more influence than general purpose local organizations.

External integration--It is hard to draw a line between the village institutional development and its external integration (Young and Young, 1962). Based on the study of Mexican villages, these two authors state that village complexity in terms of institutional structure and its communication growth

are closely related. They call this phenomenon as articulation of the community with the larger society. The basic premise for their argument is that the external society can incorporate a local community only to the degree that the latter has the variety of institutions necessary for adequate participation. In certain cases however, the village may have good access to the external society by virtue of its geographical location. Although the issue of how a particular community is articulated to the external society is important, in this study the researcher is interested in the effect of external integration on the collective adoption process. This argument implies that a community with better access to the external community might develop rational values, and its people become interested in better living standards and in organizing their scarce communal resources for collective benefit.

Elements of Social Forestry Extension

The basic premise is that forestry extension education efforts will motivate people and influence their decision making (both at household and community level) in the adoption process of social forestry. Extension agency provides a communication link between a resource system and the village system. Even though much of the literature on extension education focuses on agriculture and rural development, forestry extension falls mostly within the general pattern of those extension services. Extension has been defined as "an on-going process of getting useful information to people (the communication dimension) and then assisting those people to acquire the necessary knowledge, skills, and attitudes to utilize effectively this information or technology (the educational dimension)" with a goal of enabling them "to use these skills, knowledge, and information to improve their quality of life" (Swason and Claar, 1984:1). In this context however, it is important to view this process as a dialogical relationship between the client and change agent, otherwise by mere "persuading, extending, entrusting or dictating technical capabilities" the rural people are likely to become "oppressed and domesticated" (Freire, 1973).

Objectives and Principles of Forestry Extension

Forestry extension activities are mainly based on a desire to promote productivity, sustainability and equitability in tree growing programs. In order to achieve this objective, forestry extension serves as an informal self-development process. The specific objectives of forestry extension however, are mostly dictated by the program's goals. It may have a wide range of objectives ranging from awareness campaigns to helping people make decisions. The forestry extension should help people to recognize a need, to examine a problem and consider if it may be solved, or at least alleviated, by using forestry techniques

within the range of their skills and resources (Sim and Hilmi, 1987). Disseminating information, providing technical forestry skills, encouraging local participation, and meeting a project's physical targets can also be considered as objectives of forestry extension systems (Falconer, 1987).

Although forestry extension principles mostly overlap with those of agricultural extension, Sim and Hilmi (1987:20) have listed six basic principles of forestry extension as follows:

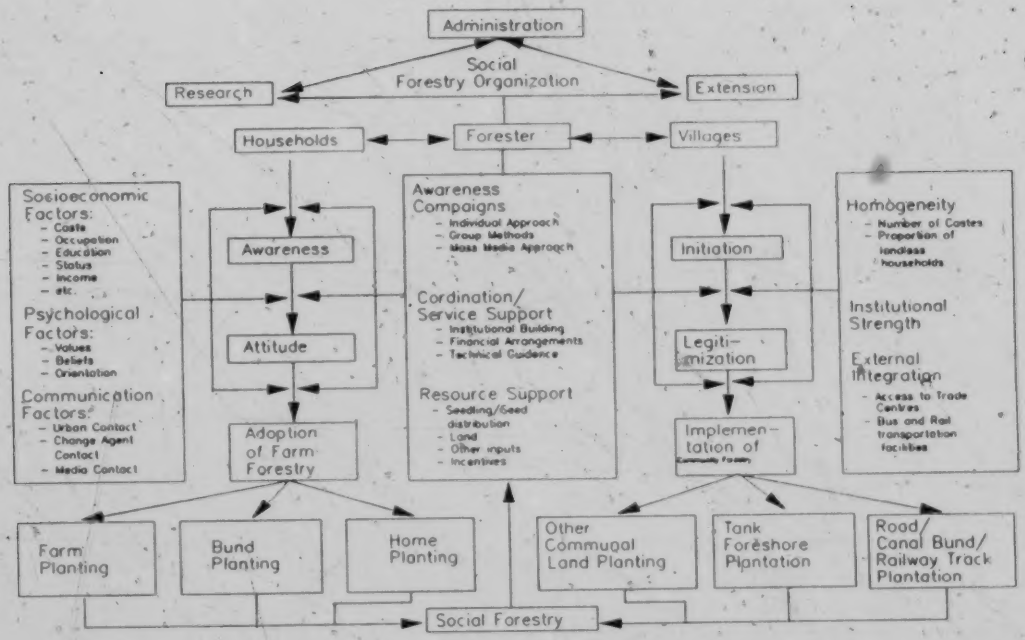
> 1. The welfare of the people, particularly the poor or landless members of the community, is an essential objective of a democratic society.
> 2. The trees and forests of a country hold potential benefits for all the people.
> 3. The achievement of national objectives in forestry and rural development in many countries depends to a large extent on the support of the people and their willingness to act together, where necessary, to achieve these objectives.
> 4. If the people are fully and accurately informed they will usually accept, and will support and respect, reasonable programs and laws to preserve and develop forest resources.
> 5. People who are aware of the importance of forest resources to the development of their country will, as far as their circumstances and understanding allow, try to use and enjoy these resources carefully and not to deprive others of their benefits.
> 6. Both official and voluntary action programs directed towards the conservation and development of forest resources have a greater chance of success when they are coordinated at all levels and directly related to the needs of the people.

Client Systems and Social Forestry Adoption

The forestry extension organization has a mandate to serve both households and villages. The forester who is representative of this change agency is responsible to facilitate the flow of messages and resources from change agency to the client system. In social forestry adoption model (Figure IV.2) the functions of the forester are grouped into three categories. Those included are: awareness campaign; coordination and service support; and resource support. Each category includes several types of activities, which may directly or indirectly promote both farm forestry and community forestry adoption process. Based on the client system and the stage of adoption process, the forester's approach will change in performing these functions.

With regard to farm forestry, the basic premise is that technology will transfer from more progressive households/opinion leaders to others in a rural community. This premise is based on the assumption that rural communities are relatively homogeneous. However, foresters should be careful in identifying these opinion leaders. Lessons drawn from many studies have shown that a better understanding of social structure and local culture of client system is essential in persuading rural people to accept change. This is true particularly in the case of foresters. Traditionally, their roles were limited

FIGURE IV 2
SOCIAL FORESTRY ADOPTION MODEL



to forest protection, policing and revenue collection (Shah, 1988). They generally have little or no training in the social sciences, but they are made responsible for working with villages and groups. In promoting community forestry at the village level, forester has to do much liaison work. In social forestry adoption, choosing specific communication techniques is an important point to be considered.

Extension Methods in Social Forestry

Communication is the key factor in awareness campaigns. It is the process through which information is exchanged between two or more participants (Rogers et al., 1988:305). The choice of communication channels depends largely on socio-cultural factors of the target system and on infrastructure availability with the change agency. People learn in different ways; some by observing, some by listening, some by reading, and some through discussions. Therefore, the forestry extension methods chosen must be suited to the local situation and needs of the people. There are a substantial number of proven educational methods from which a change agent can choose to set up learning situations (Kang and Song, 1984).

Individual approaches--These enable the forester to know the clientele and their needs, secure cooperation and participation, and give immediate feedback. The visits to homes and fields provide the foresters a first hand knowledge of their clients' problems and farming systems, and help develop good will and confidence (Sim and Hilmi, 1987). However care should be taken not to visit more frequently the families with whom good relations have been established at the expense of establishing better relations with others, to prevent jealousy and resentment.

Group methods--Approaches such as meetings with various functional groups (women's organizations, youth clubs, farmer organizations etc.,) will be effective if the forester wants to reach more people. For example, "Gaun Sallah" system (village dialogue), a method used for local planning of community forestry in Nepal was very effective (Hamal, 1989). The success of group meetings however largely depends on the forester's knowledge of local power structure and group dynamics. This is important because in almost every village there may be internal inequalities, divisions and distinctions. "Over time these distinctions become patterned and stabilized and different life-styles, beliefs, values and behavior come to be associated with different status positions" (Sofranko, 1984:62). As social interaction may be limited within certain status groups, it is important for the change agent to have an understanding of the different strata of the village. Further, it is also essential for the forester to examine the ways in which people are organized, the enduring social relations, the dominant social bonds and collective relationships that exist in the target villages.

Mass media--These are generally used to broadcast information and to publicize issues. They are particularly useful in making large numbers of people aware of innovations (Behrens and Evans, 1984). Mass media methods include radio, news papers, magazines, pamphlets, books, posters, television etc. Even though they have "little impact on sustainable participation", they can influence people by providing information (Falconer, 1987). In Tanzania, and Gujarat (India), publicity campaigns generated interest among people about forestry activities thereby increasing the seedling distribution activities.

Position of Forester in Extension

The extension worker primarily takes information (institutionally organized knowledge) from research, disseminates it to the household or village and gives feedback on indigenous knowledge to the research. In the process of adoption, the forester gets feedback from the target system on both the means and the ends of the program. This feedback from both systems will enable the change agency to plan extension programs to suit the conditions. Forest extension is just one among many organizations (agriculture, horticulture, animal husbandry etc,.) which tends to produce change in rural society. Rural

people will not isolate their forest problems from other priority needs. Therefore, it is necessary to coordinate programs with other departments by aiming at integrated development. Building local level institutions is another approach in making the programs last longer. Community forestry experiences from Nepal, South Korea, Philippines, Indonesia, and parts of India reveal that building specific institutions is the key to successful promotion of forestry programs. Finally some households and communities may be at a disadvantage in adopting forestry practices for want of adequate resources. In this situation, based on the resources available with change agency, the change agent should extend necessary resource support in the form of seedlings, land, fertilizers etc.

In sum, change agent plays one or more roles depending on the type of clientele system. As an initiator, he/she must stimulate a feeling of need in the household/village. As an enabler, he/she should facilitate the mobilization the resources in the community, so that the community identifies their problems, and plans to solve them. As an expert, he/she should diagnose and provide technical expertise on the problem, and coordinate with change agency for resources (if necessary) (Malhotra, 1985). As the type of approach followed to ensure people's participation, and the organizational structure of the change agency influence forest extension activities, those issues are discussed further.

People's participation

Participation is the degree to which members of a community are involved in the decision making process. As a principle "all changes should be introduced with the fullest consent and participation of those whose daily lives will be affected by the change" (Margaret Mead in Boyle 1981:91). In the social forestry literature, the importance of people's participation in successful implementation of the programs is adequately emphasized (Sen and Das, 1988; Stewart, 1988; Banerjee, 1988; Basu, 1984;). There are two main ways to ensure participation that are discussed in the extension literature: top-down and bottom-up approaches. The top-down approach takes the need for an innovation, focuses on communication, and reinforces the hierarchical relationships between the forester and the client (Falconer, 1987). Falconer goes on to say that this approach, by generating superior attitude in forester, and by creating a dependency behavior in client, has a negative impact on sustainable local participation.

On the contrary, bottom-up approach ensures participation of local users from the early stages of the program, and ensures the facilitator role of change agent. It examines the needs of rural people and constraints placed on them by their physical and social environment, ensures the use of indigenous skills to build on, and gives scope to act on their felt needs. Despite the drawbacks experienced with top-down approach in social forestry many reasons, such as, shortage of foresters, lack of adequate

training for foresters in social sciences, and the established hierarchical relationships are compelling the forestry organizations to practice this approach. Bottom-up approach is costly in terms of time, number of trained personnel required and their supporting systems. Therefore, many authors have suggested an appropriate mix of these two approaches to suit the specific situations. For example, in the earlier stages foresters can assume a more active role. As the programs mature, responsibility can be transferred to local community groups.

Social Forestry Organizational Structure

Effective extension work requires an extension organization. As forestry extension workers are expected to help change the conditions for the community so that people grow trees themselves, an effective network is essential (FAO, 1986) among research, field staff and other development departments. FAO (1986:107), while reviewing various problems of creating an organizational structure for forestry extension, has presented four potential options to select or establish an organization. They include:

1. setting up special district level forestry extension services
2. giving the responsibility to the existing District Forest Office
3. utilizing an extension service covering general rural development
4. using an extension service in one of the sectors of agriculture.

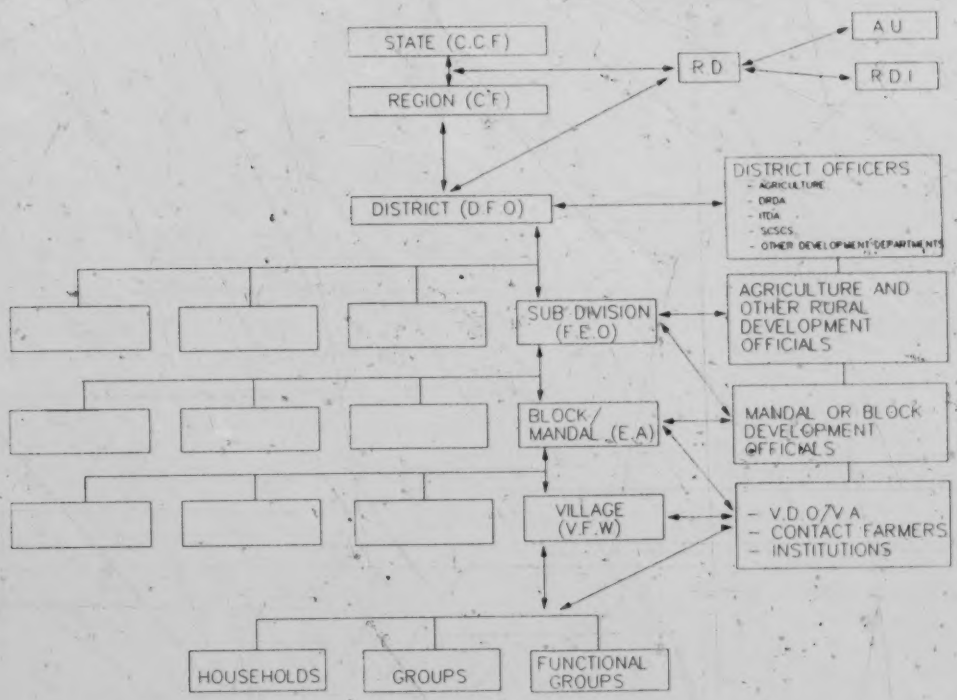
In India, most of the states have separate forestry extension services from the state down to grassroots level. Their impact however, is not appreciable to any significant extent in most of the states (Sen and Das, 1988:129). This is due mainly to the absence of an effective organizational network for extension at the grassroots level.

An effective extension organization needs strong linkages among administration, research and field extension wings. Historically, agricultural extension services are succesful because the extension personnel are being trained regularly, and their program is renewed and revitalized by addition of knowledge and practices flowing out from experimental stations. Although forestry extension organizations are established with similar aims, in practice they are faced with many impediments. The research wings of forestry departments are poorly developed and the field level staff do not have direct links with subject matter specialists. The grassroots functionaries are mostly either drafted from the regular forest staff, or hired (village forest workers) on an ad-hoc basis without any formal status in the social forestry organization. They lack adequate skills to work with rural people. The field level personnel are overloaded with routine tasks, insufficiently supported with information, transportation, and the

resources they need to deliver the goods to local households or villages. The responsibilities of the field level staff have been increased, but the linkages with research and development wings have not been strengthened. Social forestry is essentially an interdepartmental program. It is important to have stronger links with various departments of rural development. Keeping in mind the limited resources available within social forestry departments (both human and physical resources), a generalized organizational chart is presented in Figure IV.3.

FIGURE IV.3

SOCIAL FORESTRY ORGANIZATIONAL CHART



C.C.F. : Chief Conservator of Forests
R.D : Research and Development
A.U : Agricultural University
R.D.I : Rural Development Institute
C.F : Conservator of Forest
D.F.O : District Forest Officer
F.E.O : Forest Extension Officer
SCSCS : Scheduled Castes Services Cooperative Society
E.A : Extension Assistant
V.F.W : Village Forest Worker
DRDA : District Rural Development Agency
ITDA : Integrated Tribal Development Agency
V.D.O : Village Development Officer
V.A : Village Assistant

The organizational set up in Figure IV.3 is somewhat similar to the one existing in Andhra Pradesh. But stronger linkage between research and field level staff and greater coordination between forestry staff and other development staff is emphasized. At the state level, the organizational head (Chief Conservator of Forests) is supported by Regional Officers (Conservator of Forests) through which district extension programs can be coordinated. The head is also being supported by a strong research and development wing to plan the programs in consultation with Regional and District Officers. In the beginning the research and development wing can coordinate support activities through regional offices. When the program size and responsibilities of field staff grow to a significant stage, it should have more direct links to the district office. At state level, the research and development wing will have stronger links with Agriculture University and Rural Development Institutes to coordinate training and other support activities for the extension staff.

At the district level, the District Extension Officer should be the leader and coordinator of the program. He/she works with the district officials to coordinate social forestry programs. In consultation with his/her field staff, he/she tries to change the program approach and services in order to give continued direction to change. District Extension Officer is the main link in the line organization between the Chief Conservator of Forests at state level and Village Forest Workers at the village level. He/she is responsible for coordinating training programs for, and in solving the major technical problems of field level staff in consultation with the regional office and research and development wing.

The Forest Extension Officer, is head of the field level extension programs. He/she works with Extension Assistants who in turn must rely on Village Forest Worker in gaining the villagers acceptance of the research wing recommendations. The field extension staff should have high technical competence and be knowledgeable about the use of various extension methods. These three levels of staff should work closely with their counterparts in the other rural development departments so that conflicting messages are not received by their clients with regard to land-use patterns. The field extension staff will closely work with the rural people in three basic ways.

1. They can use the contact farmers which are identified by the agricultural extension staff to spread the message on tree growing to their fellow farmers.
2. They can take up target group specific programs with an objective of involving all sectors of people in tree growing activities.
3. As the village institutions are the vehicles for social forestry adoption, they can help villagers build specific local organizations (village forest committees) and work through them.

Chapter V

RESEARCH DESIGN AND METHODS

Selection of the Research Problem

Prior to enrollment as a graduate student, the researcher was a forester in charge of social forestry and other forestry programs in Andhra Pradesh (A.P), India, over a period of six years. Implementation of Canadian International Development Agency (CIDA) aided social forestry project in A.P., has been one of the major tasks of the Forest Department since 1983. This project made many provisions for support activities such as in-service training , study tours, and graduate studies abroad. Because of his involvement in social forestry activities, the Forest Department of A.P. selected the researcher as one of the candidates for graduate studies. Later on with the help of Forestal International Limited, Vancouver, Canada (Executive Agency for CIDA aided social forestry project) the Forest Department, sent the researcher to the University of Alberta, to study social forestry.

From the beginning, the researcher's aim was to get an in-depth understanding of the concepts and principles of Rural Sociology in relation to social forestry. Because of this objective the researcher often chose social forestry-related areas for his assignments and term papers during his course work. To be specific, in one of his courses he designed a research proposal as one of the requirements. The exploratory literature search conducted for that purpose became a starting point for this research. After completing a year's course work, the researcher felt that his academic knowledge and professional experience had given him adequate background and valuable insights in undertaking a research project in social forestry. Hence a topic that combined his interest, future commitment and knowledge in social forestry was chosen with a view to promote social forestry programs in Andhra Pradesh.

Types of Data Required

The major objective of this study is to determine the factors influencing the adoption of social forestry in West Godavari district, Andhra Pradesh, and to gain insights of implications for improving the on-going forestry development programs. In order to achieve this set of objectives, a variety of information was to be collected both on household and village levels. Further data on the district's physical, social, economic, and forestry related aspects were essential for this study.

As social forestry includes both farm forestry (ownership and decision making are vested with individual/ household) and community forestry (ownership and decision making are vested with village)

the units of analysis would be both households and villages. At the household level, the respondent's caste, occupation, education, material possessions, farm power, extent of land holding, and social participation may decide his/her overall socioeconomic position. Psychological attributes such as the respondent's values and beliefs will have great influence on his/her behavior. Finally, the respondent's extent of urban contact, change agent contact, and media contact will reflect his/her communication attributes. Besides this, the respondent's awareness, attitude, and adoption levels were to be measured at the household level. The data on the respondent's sources of information for social forestry adoption, reasons for tree growing, problems faced in adoption of the program, and suggestions from their point of view are invaluable in designing forestry development programs.

At the village level, it was assumed that the extent of village homogeneity and its institutional strength, and the extent of its integration to the outside society will have an influence on adoption of community forestry. These were to be operationalized in order to determine the association with adoption of community forestry.

Formulation of Study Design

In order to achieve the stated objectives, a field survey design was proposed. As the researcher is basically a forester in charge of social forestry from A.P, he thought it would be beneficial if he conducted his field survey in A.P. He also thought that the results of the research would be very useful in effective implementation of future social forestry programs in his home state. The researcher therefore submitted an abstract of his research proposal to the Forestal International Limited, Vancouver (CIDA's Executiye Agency for A.P social forestry project) with a request to obtain permission from CIDA to undertake the survey. The researcher's supervisory committee was also fully convinced about the appropriateness of the field survey and made strong recommendations that the researcher be sent to A.P. for data collection.

In April 1988, the Forestal International Limited, Vancouver (after consulting CIDA) decided to support the researcher's trip to A.P., to collect data. The company also contacted the Forest Department A.P., and requested support and cooperation in his field survey. On the assurances of the Chief Conservator of Forests A.P., Forestal made the necessary travel and financial arrangements for the researcher to go to A.P. Meanwhile the researcher prepared a comprehensive researeh proposal along with interview schedules to submitt to the supervisory committee for its approval. On May 10, 1988 the committee approved the research proposal. The following day the researcher returned to India for data collection.

Selection of the Study Area

Although social forestry programs are under operation in all 23 districts of A.P., West Godavari was one of the first three districts chosen by the Government of A.P. to establish "Forest Extension Division" in 1976. In the rest of the 20 districts social forestry programs have begun only since the early 1980s. In order to explore the problems and prospects of developmental programs the age of the programs is an important factor to be considered. For this reason the researcher selected West Godavari district. Secondly, as social forestry can be described as one of the farming systems (Chapter III), the nature of the program will largely be influenced by geo-climatic and local conditions. Therefore it was considered prudent to include a district which has the maximum regional variation. The West Godavari district has four distinct regions namely: Coastal, Agency, Upland, and Delta. Further, as one of the objectives of the study is to examine the regional differences with respect to socio-cultural factors and program adoption levels, it was decided that the study be conducted in West Godavari district.

Legitimization of the Study

In mid May 1988, on arrival at Hyderabad, the headquarters of the A.P. Forest Department, the researcher met with the Principal Chief Conservator of Forests and other senior Forest Officers. In a formal meeting the researcher explained the purpose and details of the study to the forest officials, asking for their approval. The Chief Conservator of Forests approved the request made by the researcher to recruit the interviewers and to provide the transportation facilities for the collection of field data at government expense. He also issued formal orders to his subordinates (in charge of West Godavari district) to extend full cooperation to the researcher in the collection of field data.

Before proceeding to the study area, the researcher visited the Conservator of Forests, Social Forestry (Regional Officer of the study area). The researcher knew that this individual was influential, professionally experienced, and highly knowledgeable about the study area. The researcher therefore spent two full days with him, discussing various issues about the social forestry programs and local conditions of the study area. In late May 1988, on arrival at Eluru, the West Godavari district headquarters, and also the field headquarters for the study, the researcher introduced himself to the district officials of the forest department, explaining the purpose and details of the survey to obtain their cooperation. The author knew most of the forest officials in that district and they were expecting his arrival because they had received the orders of their Chief Conservator of Forests.

The author was then introduced to the District Collector[1] and to the other district officials. The researcher explained the purpose and details of the survey and their cooperation was obtained. As all the village officials and institutions are under the control of the District Collector, the researcher requested the District Collector to issue formal instructions to them to extend full cooperation in his field survey. Accordingly the Collector issued necessary orders to all the local officials in the sample villages, explaining the purpose of the researcher's visit and asking them to extend their full cooperation to the field study.

Then the author visited the sample villages to become familiar with the area. The author felt that legitimization of the study at the village level was a crucial factor in this type of survey. During his visit to the villages, the researcher met with local officials, village leaders, village elders and members of various organizations explaining the purpose of the study. This facilitated the full support of the village leaders and officials. This legitimization process described above not only helped in building public support but also contributed to the smooth running of the entire survey. It also contributed positively to the quality of data collected.

Sample Selection

In most of the rural development programs Village Panchayat is the lowest developmental unit. As community forestry was described as a social action and means of rural development (Chapter IV), the panchayats may have significant influence on the establishment of community forestry. It was therefore decided to treat the village panchayat as a unit of analysis. The sample frame[2](N) consisted of 809 village panchayats combining all the four regions (N=N1+N2+N3+N4=809). The help of District Panchayat and Revenue Officials was sought in grouping the village panchayats into the four regions. Figure V.1 shows the details of mandals and sample villages in West Godavari district.

It was already discussed in the preceding pages that the unit of analysis in this study is both village and household. At the village level, it was decided to restrict the sample size to twelve (n=12). Further, a minimum of one village was selected to represent each of the four regions even if they did not yield one full village under "stratified random sampling" with proportional allocation. At the household level, the number of households in the selected villages became the sampling frame.

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1 District administrative head and coordinator of developmental programs.

2 "Sample Frame is the set of people [villages] that has a chance to be selected, given the sampling approach that is chosen" (Fowler, 1987:160).

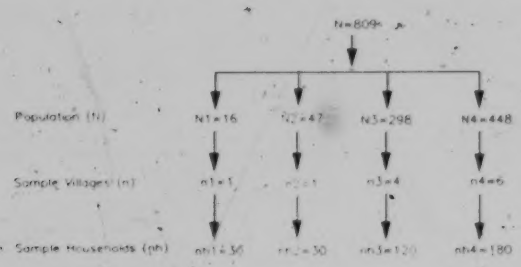
FIGURE V.1

WEST GODAVARY DISTRICT SHOWING MANDALS AND SAMPLE VILLAGES

The list of households was collected from the Panchayat Office which was prepared in 1987 for the purpose of "Mandal Prajaparishad"[3] elections. From each village thirty households were selected based on the principles of systematic random sampling as it was claimed superior to simple random sampling (Babbie, 1986:160). Figure V.2 shows the sampling procedure followed for both villages and households whereas Table V.1 gives the regional details of sample villages and the number of sample households selected.

FIGURE V.2

SELECTION OF SAMPLE VILLAGES AND HOUSEHOLDS



N=Total Number of Villages=N1+N2+N3+N4
N1=Total Number of Villages in Coastal Region
N2=Total Number of Villages in Agency Region
N3=Total Number of Villages in Upland Region
N4=Total Number of Villages in Delta Region
n=Total Number of Sample Villages=n1+n2+n3+n4
n1=Number of Sample Villages in Coastal Region
n2=Number of Sample Villages in Agency Region
n3=Number of Sample Villages in Upland Region
n4=Number of Sample Villages in Delta Region
nh=Total Number of Sample Households=nh1+nh2+nh3+nh4
nh1=Number of Sample households in Coastal Region
nh2=Number of Sample households in Agency Region
nh3=Number of Sample households in Upland Region
nh4=Number of Sample households in Delta Region

Although the selection of the study area was on the basis of judgmental sampling, selection of villages and respondents was done strictly on the principles of random sampling. The two main factors namely adequacy and representativeness were always kept in mind while selecting the sample. The stratified sampling with proportional allocation technique followed in selecting the villages ensured a greater degree of representativeness of the four regions. Further, the systematic random sampling

3 Mandal Prajaparishad is the immediate local elected body above the Village Panchayat. Each Mandal comprises about 15 to 20 villages.

technique followed in selecting the respondents guaranteed the representation of all the sectors of people in the village. As far as the adequacy of sample was concerned, a sample of 12 villages and 360 households was sufficient to represent the population, since the samples were drawn at random.

TABLE V.1

SAMPLE VILLAGES AND HOUSEHOLDS- SOCIAL FORESTRY STUDY, 1988

REGION	NUMBER OF VILLAGES	NAME OF SAMPLE VILLAGES	TOTAL NUMBER OF SAMPLE HOUSEHOLDS
Coastal	16	K.P.Palem	30
Agency	47	Itikelakota	30
Upland	298	Vegiwada	30
		Recherla	30
		Cheepurugudem	30
		Kamavarapykota	30
Delta	448	Eletipadu	30
		Khandavalli	30
		Vempa	30
		Madepalli	30
		Prakkilanka	30
		Pedanindragolanu	30
Total	809	12	360

Design of Interview Schedules

The main tools used for this study to obtain data both on an individual and on a village level were interview schedules. Yang (1955:45) defines a schedule as "a set of questions asked and filled in by interviewer in a face-to-face situation with another person". The initial interview schedules prepared by the researcher and approved by the supervisory committee were pretested, modified and improved to make them suitable to the local conditions. As the information was to be collected both on an individual and a village level, three different interview schedules were developed. Schedule 1 (Appendix 1) was intended to collect the data from the individual respondent, Schedule 2 (Appendix 2) was designed specifically to collect the details of social forestry on the village level and Schedule 3 (Appendix 3) was developed to collect details of the social aspects of the village.

Expert Advice

The different attributes of both independent and dependent variables particularly those concerning "Awareness" were discussed with experts of Forest Department, Professors of Agricultural Extension Education Institute, Professionals of National Institute of Rural Development and with some field level

social forestry officials before designing the questions. Some items in the schedules originally developed were replaced with locally suitable and adopted ones. For example, the Chapin's scale used originally to measure the "social participation" was replaced by Trivedi's (1963).

Rationale for Face-to-Face Interview

The population under study is from rural areas and mostly illiterate. Further the rural households are highly suspicious and reluctant to furnish information on cash income, and governmental programs. The legitimization by their leaders and their assurance of safety and benefit are the main prerequisites for the rural households' response. Therefore a mail survey is inappropriate in the existing educational, social and cultural climate. In addition, most of the villages have no telephone communication system, ruling out the possibility of undertaking a telephone survey. The researcher felt that a face-to-face interview was critical. However, the following additional considerations were also kept in mind in choosing the face-to-face interviews:

1. higher response rates could be obtained (the researcher got 100% response)
2. the interviewer could question, explain and probe for adequate answers (this is very important because most of the respondents are illiterate)
3. although it is costly, it is the only suitable method for the study area and the topic.

Interview Schedule Format

A good questionnaire [interview schedule] design "involves selecting the questions needed to meet the research objectives, then putting them into a form to maximize the ease with which respondents and interviewers can do their jobs" (Fowler,1987:99). As the variables to be measured on individual respondents were many, Schedule 1 was longer than the remaining two. Both structured and unstructured questions were included in the schedules. Dichotomous, fill-in type, contingency, and matrix type questions were included among the structured questions.

Dichotomous questions--These questions were asked to obtain either positive or negative response. The following question is an illustration of dichotomous question:

"Did you ever grow trees?" Yes....1
No.....2

Fill-in type questions--Even though these questions were used in all the three schedules, schedules developed to collect community level information have them in large numbers. Most of the questions asked to measure the social status of an individual were fill-in type only. An example of such a question is:

"What is your caste?" ----------

Contingency questions--These questions were asked when certain questions were clearly relevant to only some of the respondents. A typical example of these questions is given below:

"Did you ever grow trees?" Yes...1

No....2 (If No: go to Q.27)

Matrix questions--Matrix questions were asked only when they were expected to have same set of answer categories with Likert response categories. The matrix of items and answers are illustrated below:

"Beside each of the statements presented below, please indicate whether you Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA), or Strongly Disagree (SD)."

STATEMENT	SA	A	UD	DA	SD
1. Due to social forestry the unemployment problem is going to be solved.	1	2	3	4	5
2.Social forestry program gives the opportunity to the farmers/people to develop rapport with the officials of development departments	1	2	3	4	5

Among the unstructured questions, many open-ended questions were asked in all the three schedules. The difficulty with open-ended questions is grouping and constructing them into meaningful variables for statistical analysis. However a large number of them was used to stimulate free thought, to have the respondents express problems and to solicit their suggestions. The researcher expected that a number of respondents might want to express opinions or vent certain frustrations in their own terms and frames of reference which would open new dimensions in the inquiry. An example of an open-ended question is given below:

"What are the suggestions you give for the success of social forestry?"

1.----------

2.----------

3.----------

Wording and Phrasing of Questions and Translation

Even though the main spoken language is "Telugu[4]" throughout Andhra Pradesh, usage of certain words and phrases differs from region to region within the state. Hence phrasing and translating the

4 Locally spoken and official language of entire Andhra Pradesh.

questionnaire into locally spoken language was an important consideration. By virtue of his professional experience, the author has a sound knowledge of local language and culture. This was an asset in ensuring the use of simpler words and a minimum of unconventional phrases. However, the author consulted several individuals of the local area and telugu professors, and their knowledge was utilized in wording, phrasing and translating the questionnaire.

Pretesting the Interview Schedule

It was stated "that the more realistic the pretest, the more the researcher can learn about all aspects of the planned study procedure" (Fowler,1987:104). All three interview schedules were pretested in three villages of the study area but not in the sample villages. The persons chosen for the pretest were fairly representative to the final sample in terms of life situations. Thirty respondents were interviewed from three villages by choosing ten from each village for Schedule 1 pretesting. The foresters and village assistants in charge of the same villages were interviewed for Schedule 2 & 3 pretesting. It was confirmed from the pretest exercise that Schedule 1 took about one hour and fifteen minutes to complete. Some changes and additions of a minor nature were required in Schedule 1. For example, the question number 20.A was first written in this fashion: "Mokkala kshethram gurinchi[5]". Even though "kshethram" is a telugu word, all respondents expressed that they knew it as "nursery" which is an English word. Hence the question was rewritten as "Mokkala nursery gurinchi". In question number 22, when the statements were read to measure the respondents' attitude towards social forestry, about 50% of the respondents expressed that they should be given first an example. Accordingly an example was given at the beginning of the question to keep them better understand.

Definitions and Measurement of Variables

Based on the goals of the project to be accomplished, a list of variables to be measured was prepared by the researcher. The variables operationalized in both the household and the village level survey are grouped into three categories namely: Independent, Dependent, and Other variables. The key variables have been defined and their measurement procedure was discussed as follows:

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5 About tree nursery

Independent Variables

Age--Age was operationalized as number of years completed by the respondent at the time of enquiry. A weight of one was given to each year completed to work out a score for age.

Social status--It is a numerical index computed by summing up a household's scores on variables like his/her home type, caste, education, occupation, material possession, farm power, possession of land, and social participation. This scale was originally developed by Trivedi (1963) and minor modifications were made by Murthy (1974). The variables included in computation of social status and the weights of their attributes are given in Appendix 4.

Income--Originally it was intended to operationalize this variable in terms of the gross income of the household from various sources for the whole year. However, most of the respondents, particularly the wage earners, who earn their income in the form of kind and as exchange of services did not consider it as income. Further, a wage earner who earns ten rupees daily and spends seven or eight rupees on groceries (on the way home from work) does not treat ten rupees as income but considers only the balance of two or three rupees as daily income. Therefore it was decided to calculate and record the disposable income of the household. For recording purpose one thousand rupees was treated as one unit.

Value orientation--Values largely influence the individual's behavioral patterns. Values have been defined "as conceptions of the desirable, as standards of evaluation, as guides for decision making behavior, or simply as expressions of preference" (Kahl in Sofranko, 1984:58). People orient their thinking, feelings and action towards different things in life based on the values they hold (Singh 1985). The underlying assumption is that behavioral change is a prerequisite for technical change which results from change in values. For the purpose of the study a scale developed by Kittur (1976) is used. This has eight different statements, some positive and others negative. They are read to the respondent who is then asked whether she/he agrees or not with each statement. If the respondent agrees with the negative statement or disagrees with positive statement she/he will score "zero". The respondent will score "one" if she/he disagrees with negative statement or agrees with positive statement. Thus, based on the responses the respondent's value orientation is computed.

Urban contact--This has been operationalized on two levels. At first the frequency of the respondent's visit to any urban area is counted by giving an arbitrary score. At the second level, she/he is asked to reveal the purpose of the contact. If the purpose was purely for buying subsistence items (groceries, clothes etc.) the respondent would score "zero". If she/he goes to pursue matters with any

development department (other than agriculture and forestry) she/he will score "one". The respondent will score "two" if she/he makes visits to deal with agriculture and forestry matters. If the respondent's answer is "for all the above purposes" then she/he will score "three". For overall urban contact the scores on two levels are added.

Change agent contact-- The scale developed by Reddy (1971) has been used to measure the respondent's extent of change agent contact with minor modifications to suit social forestry. The officials considered as change agents for social forestry programs are: Village Development Officer, Forester, and Forest Village Worker at village level; Assistant Agricultural Officer, Assistant Director of Agriculture, Forest Range Officer, and Mandal Development Officer at mandal level; Divisional Forest Officer, Deputy Director of Agriculture, Project Director (District Rural Development Agency), and Executive Officer (Scheduled Castes Services Cooperative Society) at the district level.

In the scale a weight of "three" is assigned to the respondent if his/her contact is very often, "two" for often, "one" for occasional contact, and "zero" for no contact with any one of the officials of each level. The total change agent contact of the respondent is computed by summing the weights scored at each level.

Mass media contact--A scale developed by Kittur (1976) and subsequently modified by Desai (1977) and Seshachar (1980) was adopted with further slight modifications. In this scale various items were differentiated into five categories. They include: daily news papers; magazines, essays, and bulletins (on farm and forestry related); books on any village development issues; radio (on village programs); television and films (on agriculture and forestry). A weight of "two" is given on each category if the respondents read or listen or watch regularly, "one" if occasionally, and "zero" for never. Further if the household owns any of the items she/he gets "one", "zero" for not owning in each category. The overall media contact was computed by adding the scores on all these items.

Dependent Variables

Awareness--Awareness of social forestry was referred to as the individual's knowledge of different programs and activities of tree growing. The scale for this variable was developed by the researcher himself. The scale includes twelve different items covering the entire social forestry program. Officials of Andhra Pradesh Forest Department were consulted on the content and coverage of the items included. These twelve items represent different levels of awareness. Some are simple (households are more

familiar with), while others are complex such as "Vanamahotsava[6]" and "Social Forestry Committee". It was therefore essential to give the appropriate weight to each item. A panel of twenty five judges comprising forest officials, other department officials implementing social forestry, local leaders, and agricultural university professors was constituted to give ratings for the twelve items on a three point scale. The results of the rating for each item is given in Appendix 5. Based on the frequency of the scores obtained, appropriate weights were given to each item. A weight of "one" is given to items 3,8,11, and 12; "two" to 1,4,6, and 7; and "three" to 2,5,9, and 10. The respondent gave a reply of "yes" or "no" to each item. If the answer was "yes" the respondent was further probed to explain about the item to make sure that she/he really knew. The overall awareness of the household was computed by summing the scores obtained on each item.

Attitude--It is a generally accepted fact that an individual's feeling towards a particular object or program plays an important role in determining his/her attitude towards the same. Oppenheim (1966:105) defined attitude as "a state of readiness, a tendency to act or react in a certain manner when confronted with certain stimuli". Attitude for this study has been defined as the degree of the respondent's positive or negative feelings towards social forestry. In order to measure the attitude of respondents towards social forestry, a scale developed by Singh (1985) was used. It is a five point scale ranging from strongly agree through agree, undecided, and disagree to strongly agree. There are twelve different statements, the answers to which reflect the attitude of the respondent towards social forestry. The scale was tested by the author for its reliability and validity.

Adoption--The adoption of social forestry was defined as a practice of tree growing either individually or by the community on any available land. This was operationalized with attributes such as: number of seedlings planted, extent of area planted on farms, farm bunds, canal bunds, road sides, railway tracts, communal lands and in house compounds. Wherever households were unable to express the extent of area under trees (especially in bund planting), they were asked to state the number and kinds trees grown. Based on the number of trees grown, and the espacement followed, the extent of area planted was calculated.

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6 Tree planting ceremony celebrated through out the nation in the first week of July.

Village level variables

Social homogeneity of the village was operationalized by counting the number of castes present in the village, and the proportion of landless households in the village. The institutional strength of the village was measured by counting the number of institutions present in the village. Village institutions included are: political, religious, cultural, and developmental in nature. Finally the extent of integration of the village with outside society was operationalized by measuring the village's access to bus and rail transportation, and to the daily market. The types of plantations which are considered as community forestry are already described in Chapter II. The details of community forestry were collected from the forester[7] in charge of the village.

Collection of Data

As the sample was fairly large, and the time was limited the researcher engaged 6 interviewers and 2 assistants for survey and verification of the interview schedules. The help of local forest officials was used in selecting eight unemployed graduates, who were natives of the study area. It was assumed that the natives have the same cultural background as the respondents which would be an added asset for this survey.

Interviewers' Training

One of the important aims of this process is teaching trainees to be standardized interviewers who do not affect the answers they obtain. From the existing literature, it is clear that interviewing is a difficult job. Failure to perform that job properly may result "in getting inaccurate or biased answers" (Fowler, 1987:111). The author paid a great deal of attention to the training and management of interviewers because he felt that they play a central role in data collection. The purpose of the study was explained with a special emphasis on each question in the schedules. The trajning was given for six days including two days of practical training in the villages where they actually used the schedules to interview rural families for practice. Besides this, pretesting of interview schedules was taken as another opportunity to standardize their behavior.

The main aspects covered in the training included were:

1. the method of presentation of the study
2. the method of asking questions

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7 The forester maintains a record on the details of the plantations raised in his operational area. He collects information from other departments, village institutions and villagers.

3. the method of probing when the answers were inadequate

4. recording answers

4. handling interpersonal aspects of the interview

Rapport With Rural Respondents

After selecting the sample villages, concerned Mandal officials, forest officials, village officials and panchayat presidents of the sample villages were informed about the dates on which the survey was to be conducted in their villages. Upon arriving in each village on the specified dates, the researcher called on the village officials, both formal and informal leaders, and elders of different castes. They were fully informed of the purpose of the survey and were requested to attend the sample selection process for interviews with individual household respondents to be held at grampanchayat office. As public places in villages serve as important channels of information, the interviewers were instructed to visit public places such as tea shops, temple areas, street corners and other local institutions to inform the public about the purpose of their visit, the survey, and the venue and time of the respondents' selection. This process was very effective and in every village there was always a large gathering to see the random selection of respondents from their village. This was another opportunity used by the researcher to inform the people about the purpose of the study. Additionally, leaders and elders of the village were once again requested to legitimize the study with their friends, relatives and fellow caste men.

Interview Dynamics

The research team was always pleasantly surprised because many respondents were at home awaiting for the interviewers. When some of the respondents were asked why they stayed at home and how they were aware, the responses were:

1. "I was there at grampanchayat office yesterday when my name was selected"
2. "When you came all the way from a foreign country to ask us questions about social forestry - I should show the courtesy to stay at home one day.
3. "My kulapedda[8] informed me about your visit".

It has already been mentioned that the interviewers were adequately trained and had knowledge of the respondents' cultural background. At the beginning of the interview the members of the respondent's

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8 Caste leader

family were greeted in a traditional style and asked "who in that house makes decisions on farm and family matters?". If that person was available, he/she was asked politely whether he/she could spare about one and a half hour. The persons interviewed were assured of anonymity of their responses and every opportunity was used to give the respondents sincere recognition of their efforts and indicate how critical their information was for the study. The research team spent three days in each village: the first day was used to establish the contacts and select the sample, and the remaining two days were used for interviews. Each interviewer was expected to complete three or four interviews per day depending on the availability of the respondents. As the time was very limited to complete the survey, the research team camped in the sample villages during the survey period. Even though the team faced many difficulties with poor facilities in camping, the overnight stays helped greatly in developing better contacts with villagers and understanding the surroundings. Thirty-five days were necessary to complete the survey in all twelve villages.

Researcher's Role in Data Collection

The researcher spent most of his time in supervising the interviewers, providing them with clarification on various aspects of the interview dynamics. The researcher also conducted a minimum of five household interviews himself in each village to learn about the research problem firsthand. The researcher himself administered Schedules 2 & 3 to the Forester and Village Assistant in charge. He also collected certain information required by the study from each sample village. Every evening the interview schedules completed for that day were edited, scrutinized and corrected.

Reliability and Validity of the Variables and Measurement

During the course of constructing and evaluating measurements the researcher paid special attention to two technical considerations: **reliability** and **validity**. The value and significance of the study depends upon these two factors. Reliability refers "both to the accuracy of the measurement and to its consistency" (Slattery, 1986:10). In other words, "reliability is a matter of whether a particular technique, applied repeatedly to the same object, would yield the same result each time" (Babbie, 1986:109). Babbie (1986), summarizes some of the techniques to create reliable measures as follows:

1. by asking only about things the respondents are likely to know the answers to
2. by asking about things relevant to them and being clear in what is asked
3. by using measures that have proven their reliability

in previous research

4. by being clear and specific, and having training and practice.

All these measures tend to avoid a great deal of unreliability and grief. Validity refers "to the extent to which a measuring instrument actually measures what it claims to be measuring" (Slattery, 1986:10). Before analyzing the adequacy of the measurement, the researcher should ensure that there should be general agreement on the **face validity** of that instrument in measuring a specified variable. There are three more types of validity which are commonly discussed in analyzing the adequacy of the measurement (Babbie, 1986). **Criterion-related Validity** is sometimes called predictive validity and is based on some external criterion. **Content Validity** refers to the degree to which a measure covers the range of meanings included within the concept. **Construct Validity** is based on the way a measure relates to other variables within a system of theoretical relationships.

The details presented in the foregoing pages will testify that all efforts were made to accomplish the highest degree of fairness in designing the interview schedules and in collecting the data. With regard to the reliability of the measurement, the researcher always kept in mind the measures creating reliable measures. He was specific and clear in wording and phrasing the questions and ensured questionse relevant to the respondents. With regard to the validity of the questions, in addition to conducting literature search, a cross section of experts' opinions covering the fields of forestry, extension education and rural development were sought in developing the schedules. For example, the attributes of social forestry awareness were checked for their face validity and each respondent was further probed (if the answer was "yes") to explain the attribute. This is one of the criteria used to measure the validity of the respondent's actual awareness of the attribute. The content of the attributes of awareness range from simple seedling distribution aspects to major policy issues such as the social forestry committee. Finally, the measurement was constructed with a theoretical expectation that the respondent's awareness would be transformed first into attitude and later into adoption.

Analysis of the Data

Coding

The information collected through the interview schedules (both households and village level) was converted into numerical codes and tabulated. The coded information for each case exceeded 80 columns therefore 2 lines were used for each case. At the beginning of the second line the identification number of the case was repeated and record number was specified. Thus two separate data files were constructed for household and village level surveys.

Reading the Data

The "SPSSx" program was used as an analytical tool. The data were arranged in fixed format by putting each piece of information in the same column locations for each case. To read the two data files, two separate control files were constructed by specifying the format of the data, variable names and values, and missing values. Some of the variable values were recoded in order to compute the overall scores.

Analyzing the Data

In order to present the descriptive statistics of the study frequencies and cross tabulations were run across the regions. Before running cross tabulations the values of variables were grouped into categories (based on natural classification) such that they represent the categories of the population. For the variables which were measured on ratio scale, means and standard deviation were computed across the regions.

In order to determine the association between independent variables (continuous) and dependent variables correlation procedures were used. The significance level was fixed at 0.01. Regression analysis was used to determine the net effect of each variable on the dependent variable, and also the combined effect of all variables. In order to analyse the regional differences with respect to respondents' socioeconomic, psychological, communication, and social forestry program attributes analysis of variance procedures were used. T-tests were performed to analyse the differences between the adopters and non-adopters of the program with respect to the latter attributes.

At the village level, the adoption of community forestry was treated (dependent variable) as dichotomous. The values of independent variables were grouped into categories and Chi-square tests were performed to determine the association. As the sample was small, the cells with expected frequency of less than 5 exceeded 20%. Therefore the categories were further collapsed and Fisher's Exact test was used (with two by two contingency tables) to find the association. The next Chapter presents the analysis of data, followed by discussion.

CHAPTER VI

DATA ANALYSIS

With the objective of analyzing the adoption process of social forestry in West Godavari district, Andhra Pradesh, a variety of data were collected. The data were analyzed to determine the factors influencing the adoption process, and to review other important adoption related aspects. In this chapter, those analytical results are discussed in three parts. In the first part, the effect of household's socio-economic, psychological and communication characteristics is determined in influencing the respondent's awareness, attitude and adoption levels of social forestry. Then the regional variations with respect to their socio-economic, psychological and communication attributes, and the levels of awareness, attitude and adoption of social forestry are discussed. Finally, the differences between adopters and non-adopters are analyzed with respect to the latter attributes. The second part deals with the village characteristics and their influence in establishing the community forestry plantations. In the third part, the results on adoption related aspects such as households' sources of information on social forestry programs, their fuel and fodder situation, and their motives behind the adoption of social forestry are discussed. In addition, the details on problems faced by households in tree planting, and their suggestions for the improvement of social forestry programs are discussed.

Households' Related Characteristics and Adoption of Social Forestry

As discussed in Chapter IV, the basic premise is that the younger, better educated, higher status households, if they are linked with external social systems, should be in a better position to know about social forestry programs, develop a more positive attitude and adopt more social forestry. This proposition has been tested in many different situations for many innovations (Kivlin et al., 1971:155). As the diffusion model is used to explain the adoption of farm forestry practices in this study, an attempt is made to determine the extent to which the latter proposition is true in accounting for social forestry adoption. The adoption process model which was discussed in Chapter IV, involves two preliminary stages namely: awareness (getting to know about the innovation) and attitude (forming a favorable or unfavorable opinion towards the innovation) before making the decision to adopt or reject the innovation. Therefore, in this study, households' awareness and attitude were treated as dependent variables with respect to sociological characteristics, and as independent variables with respect to their adoption of social forestry. In this analysis wherever chi-square tests were used, awareness, attitude, and

adoption variables were divided into three categories. Awareness was divided into three levels ie. low (0-5 units), medium (6-13 units), and high (above 13 units). Attitude was perceived at two levels ie. less favorable (0-42 units), and favorable (above 42 units). Similarly, adoption was divided into four categories ie. zero adoption, low (0.01-0.05 acre), medium (0.06-1.0 acre), and high adoption (above one acre).

Socio-economic Characteristics

Table VI.1 lists the attributes of households' social status along with their age, income, psychological and communication variables and their relationships with awareness, attitude and adoption. Table VI.1 reflects the fact that both correlation and chi-square techniques have been used in analyzing the data. Several of the variables such as caste, education, occupation, family type and size, land ownership, and social participation did not have continuous distributions. In this situation where correlation was not appropriate, chi-square test of significance was used.

Age--As shown in Table VI.1, age is not significantly related (correlation coefficients are not significant at .01 level) to any of the three dependent variables. The commonly stated proposition for agricultural practices, that younger farmers are more innovative than their older counterparts (South et al., 1965) is not justified in the case of tree growing. This may be partly a function of the fact that tree growing is a traditional activity in the district, and there are no age group specific activities in social forestry programs.

Caste--Based on their ranking in the caste hierarchy, respondents' castes were grouped into three broad meaningful categories. At the bottom level, Scheduled Castes and Scheduled Tribes were combined into one category. Castes such as Washerman, Barber, Mason, and other artisan castes were combined[1] at the middle level. At the top level, Brahmins, Vaisyas, and dominant castes such as Kapu, Kamma, and Reddy were combined into one category[2]. The chi-square values in Table VI.1 indicate that caste status does make a difference in all the dependent variables. Traditionally, households occupying higher rungs of caste hierarchy would control more resources than those who occupy the lower rungs of caste hierarchy (SIDA 1981 Social Forestry Project Report, Tamil Nadu, also observed this fact). Bose (1961), has also concluded from agricultural studies that higher castes adopt more farm practices. Further, members of lower and middle caste groups may not communicate easily with extension workers who would be mostly drawn from the upper castes (Kivlin et al., 1971).

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1 Government considers this category as Backward Castes.

2 Government considers this category as Forward Castes.

TABLE VI.1

RELATIONSHIPS BETWEEN SELECTED INDEPENDENT VARIABLES AND DEPENDENT VARIABLES

ITEM	AWARENESS N=360	ATTITUDE N=284	ADOPTION N=360
Age	-0.05*	0.06*	0.06*
Caste[1]	38.40	14.80	42.44
Education[1]	121.97	23.70	36.72
Occupation[1]	51.03	32.80	81.80
Family Type[1]	5.27*	4.90*	10.83
Family Size[1]	5.07*	5.90*	18.41
Possession of Land[1]	76.40	38.90	115.86
Social Participation[1]	27.90	7.80	2.70*
Material Possession	0.57	0.38	0.42
Farm Power	0.44	0.29	0.43
Social Status	0.70	0.45	0.47
Income	0.56	0.34	0.63
Orientation	0.65	0.49	0.30
Urban Contact	0.68	0.51	0.33
Change Agent Contact	0.63	0.48	0.37
Media Contact	0.67	0.41	0.35
Awareness	-	0.57	0.49
Attitude	0.57	-	0.39

1 As these variables are categorical, chi-square procedure was used. These figures are chi-square values. All other values are correlation coefficients.

* Indicates values are not significant at 0.01 level. All other values are significant.

Education--Many studies on adoption of agricultural practices (Rahudkar, 1962; Bose, 1961; Wilson and Gallup; 1955, Marsh and Colemann, 1955; Kivlin et al., 1971) have concluded that the level of education is important in adoption of new practices. In this study, for analysis purpose, all seven categories of educational achievements were grouped into three namely: illiterate, education up to middle school, and education above middle school. The chi-square values presented in Table VI.1, demonstrate that the households' educational attainment is significantly associated with their levels of awareness, attitude and adoption. This suggests that educated individuals can mobilize more information by reading newspapers, pamphlets, bulletins, and brochures about social forestry programs. These individuals have relatively more empathy than illiterate ones. The relationship also suggests that education will impart generally a progressive outlook to the individual (Copp, 1956) with regard to social forestry programs.

Occupation--For chi-square analysis, all the occupations of the respondents were grouped into three categories. The respondents whose main occupation is labor has been treated as one category. The second category includes respondents who practice their caste occupations ie. business, craft and other services. All the cultivators are treated as a third category. All the chi-square values for occupation are

significant at .01 level. This suggests that the nature of a respondent's occupation would make a significant difference in information seeking and adoption behavior. As tree growing is part of the farming systems, it can be inferred that cultivators are more likely to adopt social forestry simply by virtue of their possession of land.

Family type and size--As shown in Table VI.1, neither family type (extended or nuclear) nor its size (up to five members, or more) are meaningfully related to awareness and attitude (chi-square values are not significant). However some association of these variables is found with adoption. The reason may be due to the fact that family demands may motivate the adoption of innovations as a means to meet those demands and also compete with farm for scarce resources (Abd-Ella and Hoiberg, 1981). Therefore, it can be expected that in extended and large families the demands on productive resources would be high accounting for higher adoption. However, it is also possible that in nuclear families, because of shortage of labor, it is difficult to maintain larger areas of land under cultivation so they switch over to tree cultivation which needs relatively less labor, attention and supervision. In this study, both extended families, and larger families have higher averages of adoption than those of nuclear and smaller families (0.98 and 1.03 acres and 0.60 and 0.60 respectively). However, t-test results show that these differences are not significant at the 0.01 level. Therefore there is no conclusive evidence that the type and size of the family have an effect on the adoption process of social forestry.

Land possession--For the sake of analysis, respondents were grouped into three categories namely: landless, small and marginal farmers (up to five acres), and big farmers (above five acres). The chi-square values presented in Table VI.1 demonstrate that possession of land has a significant effect on all the dependent variables. This will reflect the fact that land ownership is both a necessary and sufficient condition for the adoption of social forestry. Even if the respondent is fully aware of the program and has a favorable attitude towards it, his/her action depends on the availability of the space to grow trees. This is evident from the answers of non-adopters to the question "why they did not grow trees?". About 90 percent of the non-adopters stated that they could not adopt tree planting because of non availability of land.

Social participation--In this analysis respondents were categorized as participants and non-participants based on their membership in formal or informal organizations. In this study as in many studies in agriculture (Bose, 1961; Kivlin et al., 1971), it was expected that social participation in formal or informal organizations would influence the adoption behavior. However, the results presented in Table VI.1 indicate that social participation is associated only with awareness and attitude but not with

adoption. This may be due to the fact that social participation exposes the individual to a wider range of ideas (Copp, 1956). Therefore, the individual is more likely to know more about social forestry programs and is likely to develop a more favorable attitude. But possession of resources may largely determine the individual's action in tree growing.

Material possession and farm power--As shown in Table VI.1, the correlation coefficients of material possession, and farm power are strongly and positively related to all three dependent variables. In agricultural studies, these relationships were attributed to the households' desires to have a higher standard of living (Wilkening, 1953). This may also be true in the case of adoption of tree planting programs. Further, as both home and farm equipment are means in the adoption process of social forestry, it can be stated that respondents with more material possessions and farm power are more aware, have more favorable attitudes and are in a better position to adopt tree growing.

Social status--In this study, household's social status is defined as a function of respondents' rank in the caste hierarchy, educational attainment, occupation, possession of land, material possession, farm power, social participation and the type of home he/she possesses. Although Trivedi (1963) included the nature of the family (nuclear or extended) and the size of the family in calculating the household's social status, in this study, those two attributes were not included in computing the social status because they did not have face validity in the local context. Besides looking at the association between the attributes of social status and three dependent variables, the association of overall social status to all the dependent variables has also been analyzed.

Almost all studies of individual differences contributing to adoption behavior show that farmers of higher social status are quicker to adopt innovations. They also adopt more (in extent) innovations (Lionberger, 1960). In this study, the respondent's social status is strongly and positively related to all the three variables. Out of the three correlation coefficients, the one with awareness (.70) is stronger than those with attitude and adoption. It is generally recognized that change agents work more closely with higher status households which increases their awareness about innovations. But it probably also reflects an increased availability of means at their command to adopt tree planting which enhances their ability to take risks. Another factor could be their higher social participation levels which increases the availability of information at their disposal as well as their ability to process information.

Income--Generally the respondent's status and income go hand in hand. From the studies on adoption of agricultural practices, it is easy to draw the conclusion that high income is a definitive

characteristic of farm operators with high adoption. As shown in Table VI.1, income is positively related to all three dependent variables. But its coefficient with adoption is the highest among the three. This may be due to the fact that the respondents with greater income would be able to afford the risks associated with long term crops like tree growing (particularly pure forest crops)[3].

In sum, we can say that respondents with higher social status and higher income would come to know more about social forestry programs, develop a more favorable attitude, and finally adopt more. They are more receptive to new ideas. Status and wealth can be viewed as permissive factors, making it possible to take greater risks and to make investments. Also, in a relatively undemocratic power structure of village life in Andhra Pradesh, social status will have a significant effect in getting access to the information and resources needed for adoption. Age, type of the family and size of the family do not appear to be important determinants of awareness and attitude.

Psychological Variables

Orientation--Orientations are predispositions which develop as the individual grows in experience and sees himself/herself in certain relationships with the rest of the group. These are "psychic counterparts of concrete actions taken by the individual" (Kivlin et al., 1971:184). A respondent's orientation is the function of his/her values and beliefs. These in turn are governed by his/her personal factors such as age, sex, caste etc., family conditions, and local influences. It must be pointed out that in reality, the overt action or decision making is the result of both psychic and situational factors. Therefore a knowledge of the orientation of an individual greatly helps in predicting, other things being equal, how he/she acts in a given situation.

Many studies in agriculture have concluded that value orientations of individuals have strong relationships to their adoption behavior (Hoffer and Strangland, 1958; Rogers, 1958; and Bose, 1962). In this study the respondent's planning orientation, income aspiration, extent of fatalism, rational thinking and achievement orientation were measured. The correlation coefficients of orientation with all three dependent variables (Table VI.1) reflect that a strong positive association exists, suggesting that progressive orientation is a necessary condition for adoption of social forestry practices.

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3 A case study from Pedanindragolanu (a sample village) reveals this fact (see Appendix 12).

Communication Characteristics

"Communication is the transmission of messages from one person or institution to another" (Kivlin et al., 1971:165). The means of communication can be direct, when information about any innovation (social forestry) is imparted to a household by a change agent. They can also be indirect and perhaps less purposeful, as when a village leader passes along information during the normal course of social interaction or when a household sees for itself by observing social forestry practices by neighbors or the external community. The premise is that the respondents who are exposed to the outer social systems are more likely to know about social forestry programs and adopt more. The same premise was used in this study to analyze the relationship between certain communication attributes and social forestry awareness, attitude, and adoption.

Urban contact--It is treated as both a direct and indirect channel of communication. It was expected that the frequency of the respondent's urban contact will serve to enhance the household's awareness of the larger society and make him more rationally oriented. The relationship of the respondent's urban contact is strongly and positively related with all the three dependent variables ie. awareness, attitude and adoption.

Change agent contact--Change agent contact is the best channel of communication in convincing, teaching and helping the farmers to put knowledge into practice (Williams, 1969). Wilson and Gallup (1955), and Marsh and Colemann (1955) have also concluded that change agent contact is an important determinant of farm practices adoption. As shown in Table VI.1, the relationship of the respondent's change agent contact to the three dependent variables is strong and positive. This reveals that this channel of communication is also very important in opening the way for increased awareness and adoption of social forestry.

Mass media contact--Like the other two communication variables, mass media also has strong and positive relationships with all three dependent variables. Publishing/broadcasting/telecasting the agriculture and forestry related programs is a regular feature in the state's communication network. Therefore, respondents who have access to various mass media channels will be in a better position to in know of social forestry programs.

It needs to be understood that all these relationships are tentative. Unless these variables are examined in multiple regression analysis where the effects of other variables will be taken into consideration, it is not known which variables are the key predictors of awareness, attitude, and adoption.

Multiple Regression Analysis

Selected variables from the correlation analysis have been carried forward for a multiple regression analysis, in order to determine the relative importance of each variable and the total variance explained by all variables and the net contribution of each variable. The criteria for inclusion of variables were, the significance of the association with dependent variables and its continuous distribution. There are three equations in Table VI.2. In the first equation, where "awareness" is the dependent variable (Y_1), social status (X_1), income (X_2), orientation (X_3), urban contact (X_4), change agent contact (X_5), media contact (X_6), and attitude (X_8) are the independent variables. In the second equation, "attitude" is treated as the dependent variable (Y_2), and the same independent variables are included except by replacing "attitude" (X_8), with "awareness" (X_7). In the third equation, "adoption" is the dependent variable (Y_3), and all the variables from X_1 to X_8 are the independent variables.

EQUATION 1

$$Y_1 = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_8X_8$$

EQUATION 2

$$Y_2 = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7$$

EQUATION 3

$$Y_3 = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8$$

In the equations, b_0 is the constant or intercept term. The b_1 to b_8 are the partial regression coefficients for the variables X_1 to X_8 respectively. The partial regression coefficients cannot be interpreted as indicators of the relative importance of variables. The actual magnitude of the coefficients depends on the units in which the variables are measured (Norusis, 1988). Therefore if all independent variables are not measured in the same units their coefficients are not directly comparable. One way to make regression coefficients somewhat comparable is to calculate Beta weights, which are the coefficients of the independent variables when all variables are expressed in standardized form:

$$\text{Beta}_k = b_k\left(\frac{S_k}{S_y}\right)$$

where S_k is the standard deviation of the kth independent variable. In the study as the variables are measured in different units, Beta coefficients are used instead of partial regression coefficients.

The results of the multiple regression analysis are presented in Table VI.2. In the first equation, all the variables together have explained 69 percent of the variation (R^2.689) in the dependent variable

of awareness. All the variables except income have significant coefficients. However, respondents' orientation, media contact, social status and urban contact are considered as stronger predictors (in that order) of his/her awareness because of their larger Beta coefficients. Both change agent contact and attitude have significant Beta values but not as high as those of the above four variables.

TABLE VI.2

REGRESSION RESULTS OF AWARENESS, ATTITUDE AND ADOPTION ON INDEPENDENT VARIABLES

	AWARENESS	ATTITUDE	ADOPTION
Equation Number	1	2	3
Number of Cases	281	281	281
Standard Error	2.49	3.84	1.87
R^2	0.69	0.37	0.43
F Value	90.29**	24.16**	28.04**
Independent Variables			
Social Status (b_1)	0.175**	0.050	-0.026
	(2.97)	(0.589)	(-0.324)
Income (b_2)	0.076	-0.035	0.557**
	(1.61)	(-0.513)	(8.62)
Orientation (b_3)	0.182**	0.147*	-0.051
	(3.90)	(2.19)	(-0.806)
Urban Contact (b_4)	0.172**	0.137	-0.052
	(3.40)	(1.90)	(-0.767)
Change Agent Contact(b_5)	0.145**	0.150*	-0.013
	(3.20)	(2.31)	(-0.219)
Media Contact (b_6)	0.176**	-0.036	-0.094
	(3.53)	(-0.498)	(-1.37)
Awareness (b_7)	-	0.296**	0.230**
		(3.50)	(2.83)
Attitude (b_8)	0.144**	-	0.180**
	(3.50)	-	(3.16)

Note: The values in parentheses are the estimated t-values of the coefficients.
* indicates the coefficient is significant at 0.05 significance level
** indicates the coefficient is significant at 0.01 significance level.

These findings support the generalizations of earlier diffusion studies that a respondent with more positive orientation, with more media contact, with higher status, with more urban contact, with more change agent contact, and with positive attitude towards innovation will have more knowledge of innovations. In this study, however income of the respondent did not come out as a significant predictor of awareness. The reason may be due to the fact that the regional differences (explained in the following section) with respect to socio-economic and adoption attributes will have a significant influence on this finding. The Delta Region with an average income of 5.40 (second best in the district) has only 7.8 units

of awareness which is far lower than the District's average. For various reasons (explained in the following section), the Forest Department field activities and extension activities are limited in this region. Further, as the species raised by the department are not congruent with the local farming systems of the Delta Region, the respondents may not be interested in the departmental forestry programs. All these have contributed for lower levels of awareness in this region with higher average income. This may be the reason why income did not turn out to be a predictor of awareness.

In the second equation, all the independent variables could explain only 36 percent of variation in attitude (R^2.36). As shown in the Table VI.2, out of all the independent variables only awareness, change agent contact, and orientation have significant Beta values suggesting that these are good predictors of attitude towards social forestry. The insignificant Beta values of respondent's social status, income, urban contact and media contact indicate that they are not important determinants of his/her attitude towards social forestry programs. But diffusion theory generalizes that all the latter variables will also influence in transforming the respondents' knowledge of innovation into a favorable opinion towards innovation.

Opinion formation is a psychological process at the individual level. Unlike getting more knowledge, attitudinal formation is not a unidirectional process. A respondent's situational, social, psychological, and communication factors will operate to alter the existing level of his/her attitudes. In other words a respondent's awareness level will not come down (except if he/she loses memory) from the existing level with influence of above factors. But the level of attitude will move in either positive or negative directions because of the influence of the above factors. In addition, a respondent's perceptions about the innovation will change based on his/her experiences with it. The experiences of the respondent are in turn influenced by the attributes of innovation (Chapter IV). If the respondent's experience is bad, all the latter factors will influence to reduce his/her favorable attitudinal levels towards that innovation. This fact is revealed from some of the case studies done in the study area (Appendix 12). Another explanation comes from the traditional values of the people. This fact is reflected in the higher favorable attitude of the Agency Region. Although the respondents from Agency Region have the lowest averages in the district with respect to social status, income, and media contact, the average attitude of this region is higher than those of Upland and Delta Region. This is due to the fact that the inhabitants of this region are mostly forest tribals. Traditionally, they depend on the forests of their vicinity for their

livelihood and they treat forests as "kamadenu"[4]. This perception towards trees has reflected in their more favorable attitude towards social forestry. However, the magnitude of unexplained variation (64 percent) in attitude suggests that a detailed study be conducted on the attributes of social forestry innovation.

From the results of the second equation (Table VI.2), we can still draw a conclusion which will be consistent with the generalizations of the diffusion research. Wilkening (1953:4) from his agricultural study has stated that once the respondent is aware of the program the change agent will encourage acceptance of innovation. The results of the study support this statement (Beta values of awareness and change agent are significant) by adding further that the orientation of respondent is also important at opinion formation stage.

With regard to adoption, in the third equation, all the variables put together could explain only 43 percent of variation (R^2.43). As shown in Table VI.2, except income, awareness, and attitude all other variables do not have significant Beta values. The highest Beta value of income (.557) indicates that although awareness and attitude of the respondent are important determinants of adoption, it is his/her economic position that largely decides his/her tree growing activity. Many agricultural studies concluded that income is the definitive characteristic of farm operators with high adoption. This is particularly true in field tree planting where the risk involved is high. In all the regions the rich who can afford to take financial risks (because of long term nature of the crop) adopt more. Further, if species grown by the department and offered to households for planting are not compatible with the local situation, the respondents will have to buy more suitable seedlings on the open market. High income households therefore, should be able to invest in tree planting. In fact out of the total adopters in the study, 51 percent have obtained seedlings from private sources. In this situation poor households can not afford to buy tree seedlings in larger numbers for field planting.

These results are from a cross sectional study. Therefore, it can not be argued that the variables, which turned out to be significant in this study will continue to determine the adoption process in future. As the program is in its initial stages, it is possible that the rich who could afford to take risks to reap the early benefits might have adopted tree cultivation more. Many have not harvested the crop so far. Therefore, it is not known whether or not they will continue the practices[5].

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4 The deity which provides every thing that human being asks.

5 From the case studies (Appendix 12) it is revealed that many innovators who have grown and harvested eucalyptus plantations have run into big loss and they developed aversion towards eucalyptus.

Regional Differences With Respect to Independent and Dependent Variables

As tree growing activity is described as one of the farming systems, the analysis of regional variations will provide insights in designing location specific programs. Therefore in this section, the differences across the regions with respect to their social, psychological, communication, and social forestry attributes are analyzed. Table VI.3 presents the results of analysis of variance for the above attributes across the regions. As is clear from the table, there is no significant difference among the means of income, orientation, and media contact across the regions. Only social status, urban contact, change agent contact, awareness, attitude, and adoption have significant F-values suggesting that regional variations exist with respect to these variables.

Based on the results of earlier studies in diffusion research, the researcher expected that the regions with higher averages with respect to socio-economic, psychological and communication characteristics will have higher levels of awareness, attitude, and adoption. But as shown in Table VI.3, the figures for the Delta and Agency Regions do not support this proposition. Only Coastal, and Upland Regions figures appear to be consistent with the above expectation. As against the expectations[6], the Agency Region has the highest urban contact and change agent. The Delta Region with an average of 17.98 (second highest) social status has the lowest average adoption.

With regard to Agency Region, there are two main reasons explaining this situation. Firstly, being a tribal village, it is not self sufficient in terms of retail services to meet the daily subsistence needs of the people. Most of the households make frequent trips to the nearest town (at least once every two to three days) to buy groceries, or to sell the forest products. Since this contact is for subsistence purposes these trips do not necessarily result in higher rational thinking of the respondents. Secondly, as the Integrated Tribal Development Agency's (ITDA) efforts are intensive in the Agency Region through various developmental programs, contacts of its agents with tribal households are intensive. However with respect to social forestry programs, ITDA has considered social forestry as means of tribal uplift only since 1983-84 and its social forestry programs are limited to home gardens and to financial assistance. The Social Forestry Department is not directly involved in this region, except in implementing tree patta programs since 1986. As ITDA is not focussing its attention in creating general awareness about the programs, the average awareness is at lower levels in this region.

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6 Generally tribal villages are treated as relatively closed communities with lesser integration with external society.
It was already argued that change agent tend to work closely with higher status groups. But this region has the lowest social status out of all the regions.

TABLE VI.3

ANALYSIS OF VARIANCE SHOWING DIFFERENCES AMONG MEANS OF REGIONS WITH RESPECT TO INDEPENDENT AND DEPENDENT VARIABLES

ATTRIBUTES	COASTAL REGION	AGENCY REGION	UPLAND REGION	DELTA REGION	F-VALUE
Social Status	18.37 (30)	10.30 (30)	17.65 (119)	17.98 (179)	4.55*
Income	6.40 (30)	2.70 (30)	5.10 (120)	5.40 (180)	2.18
Orientation	5.63 (30)	5.50 (30)	5.60 (120)	5.28 (180)	1.10
Urban Contact	6.27 (30)	6.67 (30)	5.55 (120)	5.32 (180)	3.97*
Change Agent Contact	2.10 (30)	2.13 (30)	1.45 (120)	0.94 (180)	9.53*
Media Contact	2.43 (30)	1.37 (30)	2.53 (120)	2.61 (180)	2.40
Awareness of Social Forestry	11.03 (30)	6.50 (30)	9.20 (120)	7.80 (180)	8.10*
Attitude Towards Social Forestry	44.72 (29)	42.12 (24)	41.28 (94)	41.70 (137)	4.06*
Adoption of Social Forestry	1.04 (30)	0.31 (30)	1.30 (120)	0.29 (180)	5.65*

Values with * are significant at 0.01 level. Values in parentheses represent the respective sample size.

Although the social status of Delta Region is comparable with Coastal and Upland Regions, its awareness and adoption levels are far lower than the other two. As the land is highly fertile agriculturally it is very well developed. In this region, tree growing activity is limited mostly to home gardens and bund planting. Traditionally, the respondents of this region grow coconut trees as home gardens and as bund planting. The fuel, fodder, small timber and shade trees, which are encouraged by the social forestry department[7] have no place in this Region. Therefore the adoption rate of this region is the lowest in the District. With regard to general awareness of the program, in this region, the availability of communal

7 The number of tree seedlings raised and species composition followed by the Social Forestry Department for the year 1988 is given as APPENDIX 11.

lands is limited[8] therefore the departmental forestry activities are limited. Because of this reason the size of the operational area of the change agent in delta region is maximum. In the sample, one delta forester has 98 villages against the average size of 40. This has resulted in the lowest mean of change agent contact for the Region.

In Coastal and Upland Regions both awareness and adoption levels are higher than the other two. This is because from the beginning the departmental efforts in these regions are intensive. Secondly, the species raised by the forest department for distribution are relatively more desirable to the people in these two regions. For example, in Coastal Region, most of the respondents grow either coconut or casuarina trees either as pure stands or as agroforestry. As casuarina is the major component[9] in the nursery stock of Coastal Region, respondents will have an added advantage to adopt more. With respect to attitude, Coastal Region respondents have the highest average positive attitude followed by the Agency Region. This may be due to the fact that the bag plant technique introduced by the department for casuarina, is highly efficient compared with traditional bare root seedlings. This has resulted in quicker and greater returns for households who grew casuarina with bag plants stock. In the Agency Region, (as already explained) tribal people have affinity towards trees and this is reflected in their favorable attitude towards social forestry program. It was expected that the Upland Region respondents will have more favorable attitude. Social forestry programs in that region have been going on for longer period. But as pointed out already farmers who have tried growing eucalyptus[10] in this region ran into high losses. As a result they may have developed negative attitudes towards social forestry programs.

In general, all the regions have high average of favorable attitude (an average of 42 out of maximum 60) towards social forestry. But in all the regions (except Coastal) respondents have high negative opinion about the foresters' relationships with them. In the overall district, nearly 73 percent of the respondents expressed that foresters do not evince interest (Appendix 7) in developing rapport with rural people. This concern has already been highlighted by many authors during their studies on social forestry programs. This may be due to the fact that traditionally foresters in India were required to play policing roles. Working with people in developmental and educational roles is a relatively new concept for them.

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8 Although some areas are available, they do not meet the forest department criteria for social forestry. Therefore the community forest (executed by the forest department) plantations are mostly limited to upland region where these criteria are met.

9 The department is encouraging casuarina in most of the nurseries under fuel wood sector as the unit cost of this seedling is same as eucalyptus (which is one of the traditional social forestry species).

10 This is a primary species in upland nurseries. This constitutes nearly 50 percent of the total nursery stock.

Their professional training perhaps also did not equip them to cope with new roles requiring a more intensive personal interaction with farmers. Of all the regions, the respondents from the Coastal Region have relatively good opinions about forester's relationships with them. This indicates that if the programs are compatible with the local conditions and needs, and if people benefit from the programs, they develop a good attitude. Further, the local forester's[11] dedicated efforts in forestry extension education have played a significant role in the development of a positive attitude in this region.

Differences Between the Adopters and Non-Adopters

There is a common criticism in the diffusion and adoption research that in the "trickle down" process of innovations, the poor whose social status and the extent of external integration is lower, do not benefit as much from agricultural innovations. Diffusion studies have made it amply clear that the advantaged groups always reap the benefits of new technology. In order to test the validity of this premise for social forestry, an analysis was undertaken to discover the differences between the adopters and non-adopters of the program with respect to their socio-economic, psychological, communication, and program awareness and attitude levels. Table VI.4 presents the t-test values for both categories with respect to the above variables.

TABLE VI.4

T-TEST SHOWING THE DIFFERENCES BETWEEN THE MEANS OF ADOPTERS AND NON-ADOPTERS, AND HOME GARDEN PLANTERS AND NON-ADOPTERS WITH RESPECT TO INDEPENDENT AND DEPENDENT VARIABLES

VARIABLES	MEANS			MEANS		
	ADOPTERS N=234	NON-ADOPTERS N=126	T-VALUE	HOME PLAN-TERS N=116	NON-ADOPTERS N=126	T-VALUE
Social Status	19.88	12.37	7.41*	14.22	12.38	1.78
Income	5.89	3.87	3.81*	3.70	3.86	-0.44
Orientation	5.89	4.64	6.16*	5.00	4.64	1.56
Urban Contact	6.04	4.74	5.47*	4.97	4.73	0.87
Change Agent Contact	1.59	0.77	5.60*	0.86	0.77	0.62
Media contact	2.94	1.59	6.12*	2.03	1.59	1.89
Awareness	9.54	6.47	7.40*	7.07	6.47	1.39
Attitude	43.18	39.03	8.43*	40.21	39.03	2.30*

Values with * are significant at 0.01 level.

11 The forester who is serving in this region for the past three years was honored with state level award in 1986 for his meritorious services. Enquiries about his services with local people and department officials also supported the fact that he has an excellent rapport with villagers.

The results in Table VI.4 support the previous diffusion research generalization that adopters of innovations are generally higher in socio-economic status, more integrated into the external society, and more aware of the program. However, this is not true if analysis is made between home planters and non-adopters. None of the variables show significant difference between these two groups. This may be due to the fact that home gardens are less risky and do not demand production factors (land, labor, and plants) in larger quantities. The above analyses suggest that farm related planting would be more risky and which poor could not afford. This is the reason why income turned out to be the strongest determinant of the adoption. The results also indicate that in the situations where land is a limiting factor for growing trees, encouraging home-gardens is the best alternative.

Discussion

The results presented in this part, support many generalizations of diffusion research for agricultural innovations. It is evident that like most of the agricultural extension services, forestry extension is also following the strategy of "building on the best" expecting a multiplier effect for the activities of the forester. However, in forestry, unlike in agriculture, the target group is both landless and land owners. If foresters focus on a small number of landowning, innovative, wealthy, and information seeking households it is not realistic to expect that the innovations will "trickle-down" to benefit the poor and land less. Unless target group specific programs are launched (aiming at the less advantaged groups), it is unlikely that forest department's primary objective of alleviating rural poverty through social forestry will be achieved.

The government of course, has considered this issue and taken some steps. For example, special organizations were established (ITDA, SCSCS) to improve the living standards of tribals and scheduled castes. The District Social Forestry Committee made decisions to distribute seedlings free of cost to the weaker sections of the rural population. Tree patta programs are special efforts to involve the poor and landless. In spite of these positive steps from the results of the study, it can be concluded that there remains much to be done to involve the lower status and poor people. The impediments that exist in implementation of these programs need to be carefully analyzed. Since ITDA and SCSCS have no technical personnel for raising tree seedlings and to impart technical guidance, their programs to promote tree growing are mostly limited to financial assistance. Secondly, supply of seedlings free of cost to the rural poor does not solve all the problems. They should also be given access to land to grow trees, along with other resources such as fencing material, water for irrigation, and fertilizers.

Further the type of seedlings supplied is the key in motivating the households in tree growing.

The government mostly supplies species that are useful for fuel with a perception that there is a fuelwood crisis. It is true that fuelwood is a basic need for the rural poor, but the poor villagers have so many other pressing needs which receive a higher priority than fuelwood. The rural households wish to fulfill their fuelwood needs in complementary fashion where other pressing needs are also fulfilled. For example, the rural households prefer to grow coconut as a home garden tree which produces cash income as well as meets fuelwood requirement. Finally, with regard to tree patta program, the rigid guidelines are not permitting the beneficiary to plant fruit trees and practice agroforestry[12].

In addition to the above issues, there are some organizational problems. The field foresters are being assigned certain targets for raising of seedlings, plantations, and distribution of seedlings. The foresters, because of these responsibilities, and the vastness of their operational areas are unable to do effective extension education. In view of this pressure they tend to focus on a few progressive farmers. In this process equity considerations are not given priority. This is the reason why some foresters expressed[13] that "weaker sections of rural population are not interested in tree growing"; "they only prefer wage income but not future benefits"; "why should the government insist we supply certain seedlings to the weaker sections when the demand is more from progressive farmers?". These perceptions may partly be due to the fact that foresters do not have adequate training and background in rural development issues. These organizational problems have contributed to the criticism that the main beneficiaries of the social forestry programs are the rich and well-to-do villagers.

Ideally both rich and poor should be active participants in social forestry programs. To achieve such an objective a differential approach to program implementation will be necessary. Based on the nature of the target group, and its characteristics and capabilities the program strategy of the change agency should differ.

Village Characteristics and Adoption of Community Forestry

In Chapter IV, social action was described as a frame work for community forestry. It was also discussed that social action will be influenced by many village characteristics. In this section a set of selected village characteristics are analyzed to determine their association with community forestry.

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12 According to the Forest Conservation Act (1980), no forest land should be diverted for non-forestry purposes until Central Government Permission is accorded. Because of this reason, the forest department thinks that practice of raising crops in tree land (even in initial years) amounts to violation of the Act. Further it appears that forest department does not consider growing fruit trees as a forestry operation.

13 After administering the interview schedule, the researcher had an informal discussion with foresters to learn about their perceptions on people in tree planting activities.

Social homogeneity of the village, village institutional strength, and extent of village integration to the external society were treated as important variables in determining the community forestry plantation. As the sample size was small (n=12), and the cells with expected frequencies less than 5 were exceeding 20 percent, independent variables were collapsed into two categories for calculating Fisher Exact Test probabilities.

Villages with a few number of castes (up to 10) and landless households (up to 38 percent) are considered as relatively more homogeneous than the villages with a greater number of castes and more landless households. Secondly, villages with up to 14 institutions are considered institutionally weaker than those with more than 14 institutions. Finally, villages with an average distance of below 32 kilometers to rail and bus transportation, daily market and town center are expected to have greater integration with outer social systems than those with averages above 32 kilometers. Although the dependent variable "community forestry plantation" was measured in ratio scale, for analysis purposes it was defined as a dichotomous variable based on presence or absence of community plantation.

As shown in Table VI.5, none of the attributes of the four independent variables are associated with a dependent variable. Their probability values are not significant at 0.01 level. What went wrong? In Chapter IV, a strong theoretical argument was made that social action (community forestry) would be influenced by village characteristics. But the discussion presented in Chapter II, on the approach of Forest Department in implementation of community forestry programs will largely explain the situation. The Department will execute planting works on various types of communal lands in the name of "social forestry". Only after raising and maintaining the plantations for three or four years will the department hand over the plantations to the village panchayat for further maintenance. In this process, neither the village institutions nor the villagers (some times the labor is being imported from elsewhere to execute the work) were involved in planning and execution of the program. Therefore the villagers perceive these plantations (raised by the department on communal land) as governmental programs. At times the district social forestry department had to face many conflicts[14] with local people and associations in establishing the "community plantations". This is the reason why most of the studies have criticized the approach of Forest Department for not ensuring the people's participation at all stages of the program.

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14 In 1978-79, in Nayampalli village of West Godavari district the Department had cleared the shrub growth on communal area (20 hectares) to raise a plantation and spent an amount of 28000 rupees on advance operations. At that stage the staff faced opposition from the local villagers and the planting was abandoned.

TABLE VI.5

RELATIONSHIP BETWEEN THE VILLAGE CHARACTERISTICS AND ADOPTION OF COMMUNITY FORESTRY

VARIABLE	PROBABILITY VALUES FROM FISHER'S EXACT TWO TAILED TEST [N=12]
Homogeneity of the Village	
Number of Castes	0.24
Landless Proportion	0.24
Institutional Elaboration of Villages	0.54
External Integration of Villages	0.24

None of the values is significant at 0.01 level

Ideally speaking, social action starts with identification of community needs, and their priorizing. The idea then becomes legitimized by the local power actors and the action is initiated. In this process the change agent plays a facilitator role to promote the action process. But in the process of government execution of social forestry programs in the study area these steps were completely ignored. Since villagers could not freely adopt or reject social forestry plantations through the natural social action process, various village characteristics do not appear to have any influence in determining the adoption of community plantations.

This analysis suggests that in the present approach there is limited scope for people's participation, which is considered the key to community forestry programs. Similarly, village characteristics have no influence on whether community forestry plantation will be established in a particular village. Under the present procedure, the Forest Department criteria[15] ie. nature and extent of land availability, land suitability to the species and the unit costs of the plantation seem to be the determining factors.

15 For example in the delta region, if a village has four acres of communal land which is fit for raising only coconut plantation, the Forest Department will not raise the plantation. The reason is that the area is too small (the unit cost goes up because for four acres a protection watcher has to be employed) and pure coconut planting is not envisaged as community forestry (in the view of Department).

Respondents' Sources of Information

General awareness of social forestry--Table VI.6 gives the details of respondents' sources of information on social forestry activities. With regard to the general information about social forestry, about 90 percent of respondents seek information from the villagers (neighbors, friends, relatives, and leaders), 61 percent use change agents also as sources of information, and only 40 percent of respondents utilize the media sources.

However, the extent of utilization of these information sources will vary with the type of adoption. As shown in Table VI.7, only 35.2 percent of the adopters depend on the villagers as sources of information. The majority (58.6 percent) of home planters obtained information on social forestry from villagers. But most of the bund and field planters (87 and 83.9 percent) utilized outside information sources (change agent and/or mass media). With respect to respondents who adopted more than one type of planting, very few depended on villagers for information (only 9.4 percent).

TABLE VI.6

SOURCES OF INFORMATION AT AWARENESS STAGE FOR REGIONS AND DISTRICT

(All Figures are Expressed in Percentages)

SOURCE	COASTAL REGION	AGENCY REGION	UPLAND REGION	DELTA REGION	OVERALL DISTRICT
	N=30	N=30	N=119	N=180	N=359
Villagers	66.7	83.0	96.7	92.0	90.8
Officials	73.0	73.0	77.0	46.7	61.3
Media	53.0	16.7	33.6	45.6	39.8

TABLE VI.7

ADOPTOR TYPES AND SOURCES OF INFORMATION

(N=234)

SOURCES OF INFORMATION	HOME PLANTERS	BUND PLANTERS	FIELD PLANTERS	MORE THAN ONE TYPE PLANTERS	TOTAL
Only Villagers	58.6	13.0	16.1	9.4	35.2
Outside Sources	41.4	87.0	83.9	90.6	64.8

Note: Values are expressed in percentages.

These results indicate that in general, respondents who want to adopt tree growing practices will not be satisfied with the information available within the village. They tend to utilize as many sources as possible and check for message consistency. Further if they decide to adopt field related tree planting where high investment and more risk is involved, they will invariably depend on outside information sources.

Sources of technical guidance--In the case of seeking technical guidance, it was expected that the respondents would depend more on change agents. But contrary to the expectations, as shown in Table VI.8, in all the technical issues more than 70 percent of the respondents turned to other villagers in getting aid to solve their problems.

One reason may be due to the fact that households who grow trees on bunds and/or fields choose mostly casuarina, coconut, cashew or mango which are indigenous. In the study 76 percent of the adopters planted coconut trees; 20.5 percent planted casuarina trees; and 17.5 percent planted cashew trees. Only 28 percent of the adopters planted eucalyptus, fodder and other species. Secondly, in case of home planting where risk is limited, households do not consult officials. Finally, the foresters themselves are not in a better position to solve the major technical problems of the tree growers.

As shown in Table VI.9, when the foresters were asked about their capabilities in solving the problems of tree growing, (particularly on diseases and yield particulars) 100 percent of the foresters expressed that it is better to have a research organization to which those problems could be reffered. But as discussed in Chapter II, Research and Development branch exists only at state level and is not well integrated with the field organization. Further there is no formal arrangement between Forest Department and Agricultural Department to communicate and cooperate in solving the technical problems of the program participants.

TABLE VI.8

ADOPTERS' SOURCES OF TECHINICAL GUIDANCE FOR REGIONS AND DISTRICT

(All figures are Expressed in Percentages)

TECHNICAL MATTERS	COASTAL REGION N=22	AGENCY REGION N=23	UPLAND REGION N=81	DELTA REGION N=108	OVERALL DISTRICT N=234
Species Selection					
Villagers	86.4	86.9	90.1	87.9	89.5
Other Sources	13.6	13.0	9.9	12.0	11.5
Pit Size					
Villagers	54.5	52.2	76.5	84.3	75.6
Other Sources	45.5	47.8	23.5	15.7	24.4
Espacement					
Villagers	40.9	52.2	63.0	86.0	70.5
Other Sources	59.1	47.8	37.0	14.0	29.5
Fertilizer					
Villagers	77.3	52.2	74.1	79.6	74.8
Other Sources	22.7	47.8	25.9	20.4	25.2
Watering					
Villagers	63.6	60.9	88.9	85.2	82.1
Other Sources	36.4	39.1	11.1	14.8	17.9
Diseases					
Villagers	50.0	73.9	85.2	87.0	81.6
Other Sources	50.0	26.1	14.8	13.0	18.4
Weeds					
Villagers	72.7	65.0	87.7	88.9	84.6
Other Sources	27.3	35.0	12.3	11.1	15.4
Yield Details					
Villagers	63.4	78.3	72.8	89.8	80.3
Other Sources	36.6	21.7	27.2	10.2	19.7

TABLE VI.9

CHANGE AGENTS' PERCEPTIONS ABOUT THEIR CAPACITIES TO SOLVE TECHNICAL PROBLEMS OF TREE GROWERS

(N=12)
(Values are Expressed in Percentages of Foresters)

SOCIAL FORESTRY RELATED ISSUES	CAN CLARIFY	CAN NOT CLARIFY	DEPEND ON OFFICIALS	BETTER TO HAVE RESEARCH WING
Species Selection[1]	41.6	-	8.3	50.0
Fertilizer Application[2]	16.6	-	16.6	66.8
Espacement	58.4	-	25.0	16.6
Yield[3]	-	-	-	100.0
Diseases	-	-	-	100.0

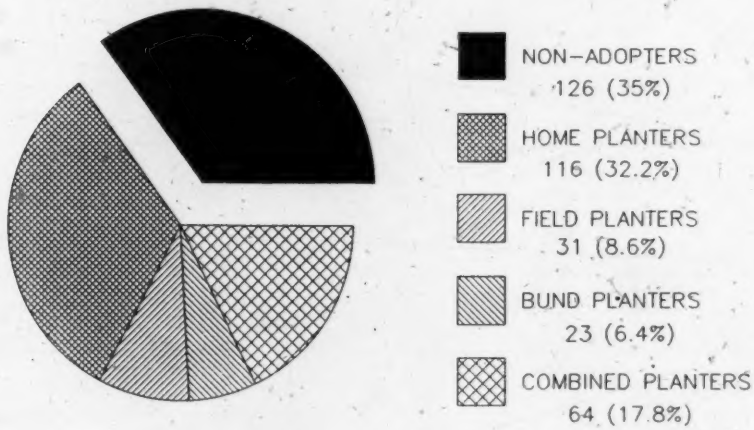
1 Includes details such as soil types, PH values, silviculture of different species and their compatibility to local farming systems. It also includes needs identification and selecting species to meet their needs.
2 Includes all cultural practices also.
3 Includes not only the future projection of harvesting yields but also the market aspects.

Types of Adoption in the District and Across Regions

Throughout the thesis, it is maintained that tree growing is a part of farming systems. These farming systems will vary from region to region. This fact is reflected in the type of tree growing across the regions. Figure VI.1 shows the details of different adopters, and non-adopters for the district.

FIGURE VI.1

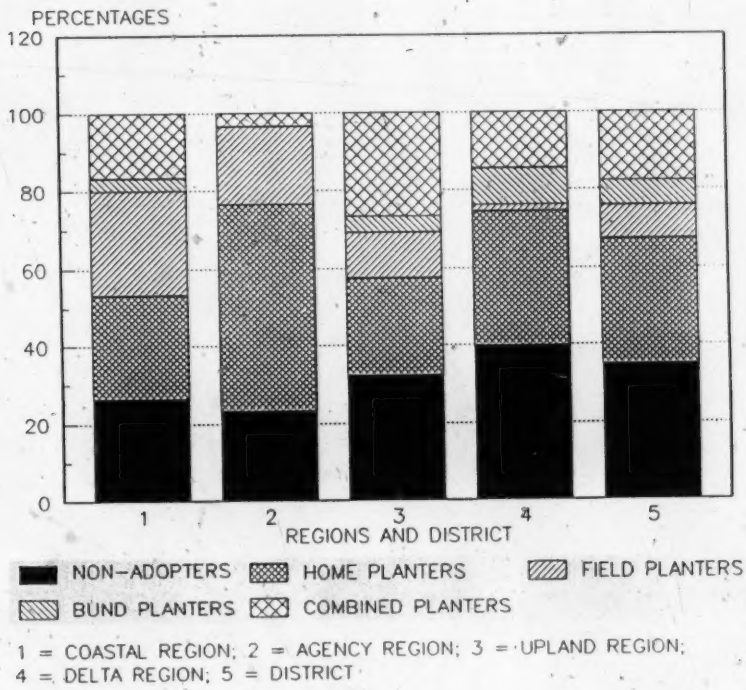
ADOPTER TYPES AND NON-ADOPTERS IN THE DISTRICT



In the district, out of the total respondents, 35 percent are non-adopters, 32.2 percent are home planters, 8.6 percent grow trees on fields, 6.4 percent grow trees on bunds, and 17.8 percent of the respondents grow trees in more than one of the above situations. As shown in the Figure VI.2, there are huge regional variations in the type of adopters.

FIGURE VI.2

ADOPTER TYPES AND NON-ADOPTERS FOR REGIONS AND DISTRICT



1 = COASTAL REGION; 2 = AGENCY REGION; 3 = UPLAND REGION;
4 = DELTA REGION; 5 = DISTRICT

In Agency Region, while home planters are about 70 percent, other planters account for only 30 percent. In this Region there is tremendous scope for all types of planting but Integrated Tribal Development Agency (for various reasons explained) is encouraging only home and bund planting. In the Delta Region there is very limited scope for field planting. Home planting and bund planting are highly practiced. Therefore out of the total adopters, home-planters and bund planters account for nearly 98 percent. However in both Coastal and Upland Regions, field planters account maximum of 54.5 and 44.4 percent respectively. It appears that Forest Department did not consider these local adoption practices in planning the tree nursery programs.

Fuel and Fodder Situation in the District and Across Regions

One of the main objectives of social forestry programs (from department perspective) is making rural people self sufficient in their fuelwood and fodder requirements. Therefore in this section, the district's fuel and fodder situation is discussed.

Fuelwood situation--Table VI.10 presents the details on respondents' fuelwood situation and their main sources of collection.

The figures are consistent with National Council of Applied Economic Research Study (Natarajan, 1985)[16]. Nearly 93 percent of the respondents use non-commercial fuel (ie. fuelwood, dung, crop residues). The regional variations about the fulewood usage are not significant but the collection patterns vary considerably. At one end, respondents from the Agency Region mainly collect fulewood from the forests (96.7%) of their vicinity, and on the other end among the Delta Region respondents, 39 percent use dung as fuel and nearly 30 percent buy the fuel. In the overall district only 20 percent of the respondents would buy the fuel. The rest of the respondents collect the fuel (through their women and children) from various sources. The opportunity cost of this labor is generally perceived as zero (Blair, 1986). Fuelwood usage and collection patterns will have implications in designing social forestry projects.

TABLE VI.10

WOODFUEL USAGE AND ITS AVAILABILITY SOURCES FOR REGIONS AND DISTRICT

(All Figures are Expressed in Percentages)

VARIABLES	COASTAL REGION	AGENCY REGION	UPLAND REGION	DELTA REGION	OVERALL DISTRICT
Main Fuel	N=30	N=30	N=120	N=179	N=359
Woodfuel	96.7	100.0	95.8	88.8	92.8
Other[1]	3.3	-	4.2	11.2	7.2
Main Sources	N=30	N=30	N=118	N=174	N=352
Forest	-	96.7	16.1	-	13.6
Dung	-	-	3.4	39.1	20.5
Buy	10.0	-	13.6	29.9	20.2
Other[2]	90.0	3.3	66.9	31.0	45.7

1 Includes kerosene, electricity, gas, etc.

2 Includes agricultural waste, trees lops and tops, shrub growth along road sides and on communal land.

16 According to the study non-commercial fuels account for 89 percent of all rural household fuels and 89 percent of all non-commercial fuel is collected by the household using.

Fodder situation--As shown in Table VI.11, nearly 60 percent of cattle owners did not have any problems with fodder. They have either excess or enough fodder to feed their cattle. Out of 40 percent of the cattle owners who expressed that they do not have enough fodder, only 21 percent would buy some quantity. The rest would collect fodder from various sources (village lands, forest lands, other private lands) to feed their cattle.

TABLE VI.11

FODDER POSITION, AND MAIN SOURCES OF FODDER FOR REGIONS AND DISTRICT

(All Figures are Expressed in Percentages)

VARIABLES	COASTAL REGION N=18	AGENCY REGION N=15	UPLAND REGION N=65	DELTA REGION N=66	OVERALL DISTRICT N=164
Fodder Availability					
Excess	11.1	-	-	3.0	2.4
Enough	55.6	53.3	53.8	63.6	57.9
Not Enough	33.3	46.7	46.2	33.3	39.6
Main Sources of Fodder					
Buy	27.8	-	32.3	13.6	21.3
From Own Land	55.6	60.0	56.9	74.2	64.0
From Village Land	16.7	13.3	7.7	9.1	9.8
From Forest	-	26.7	3.1	-	3.7
From Other Lands	-	-	-	3.0	1.2

This indicates that majority of the cattle owners have enough fodder, and only very few are buying to supplement the collected quantities. The regional variations should be considered in planning the tree nursery programs.

Respondents' Reasons for Planting

One of the major assumptions of social forestry program is that just because planners saw a pressing need for fuelwood and fodder, so too would the villagers (Blair, 1986). But the above analysis indicates that majority of the respondents in West Godavari are not facing shortages of either fuelwood or fodder. However, the respondents (both adopters and would be adopters) were asked to explain main reasons for growing trees. There were 27 different reasons (Appendix 8). But they were conveniently grouped into six major categories and presented in Table VI.12.

TABLE VI.12

RESPONDENTS' REASONS FOR PLANTING FOR REGIONS AND DISTRICT

(All Figures are Expressed in Percentages)

REASONS	COASTAL REGION N=23	AGENCY REGION N=25	UPLAND REGION N=102	DELTA REGION N=136	OVERALL DISTRICT N=286
Economic Returns	100.0	96.6	85.3	76.5	84.3
Alternate Strategy	8.7	-	8.8	1.5	4.5
Optimum Landuse	34.8	48.0	66.7	52.9	55.9
Subsistence Needs	45.5	36.0	47.1	59.6	51.7
Environmental Benefits	-	4.0	3.9	9.5	6.3
As a Future Security	-	4.0	0.9	1.5	1.4

As shown in Table VI.12, 84.3 percent of the adopters expressed that one of the main reasons for planting trees is economic returns. About 56 percent of the adopters expressed (as one of the reasons) that it would be better (economically) if they use their land optimally by growing trees. About 52 percent of the respondents have expressed that they grow trees for their subsistence needs. The other three categories (planting as an alternate strategy; for environmental benefits; and as a future security) grouped together account only 12 percent.

This analysis reveals that social forestry beneficiaries did not see things in the same way as the social forest department. The respondents want to use tree growing as an opportunity to add to their cash income by selling wood and other tree products instead of growing trees for fuel and fodder to replace cowdung or other local fuels which come mostly free of cost (See Plate VI.1 and VI.2). But the department is still continuing to raise fuelwood and fodder species in major quantity with an objective of making rural areas self sufficient in fuel and fodder requirements. As is seen above, producing more household income by growing trees is the primary objective of the respondents. This is the reason why 51 percent of the adopters have purchased on the open market or grown by themselves seedlings for their required species. This fact is also reflected in fact that locally desired coconut and other fruit trees account for less than 10 percent of the total nursery stock[17] raised by the

17 Types and number of the species grown by the Forest Department are given in Appendix 11.

PLATE VI.1
SMALL FARMER TAKING FUELWOOD FOR SALE TO NEARBY TOWN.
(Casuarina Branches and Tops)

PLATE VI.2
HOME GARDEN COCONUT PLANTING FOR CASH INCOME.
(Cowdung Cakes are for household fuel).

forest department. The foregoing discussion suggests that the rural people's needs and their priorities, and their perceptions are not taken into account in planning programs. They must be ascertained and woven into all phases of social forestry programs.

Respondents' Problems in Tree Growing

In the foregoing discussion, at various places, it was pointed that forestry programs are not fully congruent with the local needs. With the result, people might have faced many problems in adopting or in their attempts to adopt tree growing. Gaining insights into these problems of respondents (as perceived by them) will facilitate in designing and redesigning the forestry development programs to more accurately fit into the local needs. Therefore the respondents were asked to express their concerns and problems in tree growing. Those problems were grouped into eight categories (Appendix 9) for purpose of analysis.

As shown in Table VI.13, about 91 percent of the respondents have expressed their concerns about the nature of the program itself. They stated that most of the species grown by the department for distribution are not locally suitable and needed. With regard to the research and extension, about 48 (23.9+24.6) percent of the respondents stated that they have problems

TABLE VI.13

RESPONDENTS' PROBLEMS IN TREE GROWING ADOPTION FOR REGIONS AND DISTRICT

(All Figures are Expressed in Percentages)

TYPE OF PROBLEM	COASTAL REGION N=19	AGENCY REGION N=22	UPLAND REGION N=88	DELTA REGION N=156	OVERALL DISTRICT N=285
Resource Related	42.1	36.3	26.2	23.1	26.3
Program Related	94.7	100.0	70.5	100.0	90.5
Research Related	31.6	27.3	37.5	14.7	23.9
Extension Related	31.6	18.2	15.9	29.5	24.6
Incentives Related	52.6	18.2	11.4	14.1	16.1
Market Related	-	-	28.4	4.5	11.5

in getting technical guidance on various technical problems and expressed their dissatisfaction about the cooperation of the officials. Some have expressed that they get contradictory messages about the tree growing programs from forest officials and agricultural officers. About 26 percent of the respondents expressed problems about lack of adequate resources, and 16 percent of the respondents expressed their concerns about the lack of incentives for tree growing. The problems about protection, yields, and market are not in considerable number.

All these issues have major implications in implementation of social forestry programs. The fact that problems of the respondents on the nature of the program are more because the forest department is not considering the local farming systems in planning their programs. The problem with foresters is that they generally believe that villagers know little about trees. This attitude is not conducive to viewing villagers as collaborators in building a base of scientific knowledge. It is essential to involve local people in project design, and efforts should be made to incorporate them as collaborators in the research side of the social forestry.

The respondents' problems on technical matters are largely due to the fact that research branch is poorly developed to assist the field staff. If the staff is not in a position to solve the technical problems of tree growers, they will lose credibility which is a cutting edge for effective extension. A greater coordination between forest officials and agriculture staff will help in solving the problems of people on agroforestry related issues. With regard to extension, the forest staff is not fully equipped with adequate training to work with people (out of the twelve foresters interviewed, only one forester underwent training in social forestry for 12 days). It is expected that mostly poor and weaker sections need resource support and incentives. As already pointed out, unless the department design target group specific programs it is difficult to ensure their participation. Although problems on yield and market related are few at this stage (tree growing programs are in initial stage), consideration of these issues is important in continuation of the programs.

Respondents' Suggestions for Improvement of Social Forestry

With regard to their suggestions, they are consistent with their problems. The suggestions of the respondents were grouped into seven categories (Appendix 10). As shown in Table VI.14, the suggestions about considering the local farming systems are many (78% of the respondents) calling for a change in the nature of the program. The suggestions both on research and extension issues together are also considerable (85.6 percent of the respondents). 20.4 percent of the respondents have made suggestions on providing necessary inputs, and 19.5 percent suggested for providing more incentives for tree growing.

Market related suggestions were quite few. Analysis of each of these suggestions provide insights on all aspects of the program. If these suggestions are taken into consideration, most of the problems expressed by the respondents in tree planting would be solved.

TABLE VI.14

RESPONDENTS' SUGGESTIONS FOR IMPROVEMENT OF SOCIAL FORESTRY FOR REGIONS AND DISTRICT

(Values are Expressed in Percentages)

TYPE OF SUGGESTION	COASTAL REGION N=25	AGENCY REGION N=27	UPLAND REGION N=111	DELTA REGION N=170	OVERALL DISTRICT N=333
Resource Type	32.0	40.7	15.3	18.8	20.4
Program Related	44.0	88.9	80.2	80.0	78.0
Research Related	20.0	11.1	23.4	40.6	30.9
Extension Related	100.0	18.5	61.3	49.4	54.7
Incentives Related	8.0	18.5	20.7	20.6	19.5
Market Related	-	-	9.0	-	3.0

CHAPTER VII

SUMMARY AND CONCLUSIONS

During recent years much concern has been voiced about deforestation in many countries and especially developing ones. Several studies were conducted to examine the causes and consequences of forest destruction. One of the important remedial measures identified is undertaking forestation programs with active involvement of local people. As a result, extensive forestry development (social forestry) programs have been implemented in many Third World countries.

With reference to India, many studies have rated the progress of social forestry programs as low and far from satisfactory. The main criticism is that these programs have failed to involve common villagers and that beneficiaries of social forestry have been largely the big farmers. Another criticism is that community forestry has remained mainly as a government program with inadequate local participation. These failures have been attributed largely to inadequate and inappropriate extension programs. In order to gain insights into these issues the researcher undertook a detailed study both of households and villages in West Godavari District in Andhra Pradesh, India. The major objective of this research project was to analyze the factors influencing the adoption of social forestry and to gain an understanding of the implications of these factors in improving forestry extension programs.

Based on the literature search and professional experience in social forestry, the researcher for the purpose of this study defined social forestry as an activity of tree growing/harvesting/processing, either exclusively or in combination with food/fodder crops, either individually or communally by involving people with the objective of meeting their subsistence, commercial, and environmental needs. For the sake of analysis, based on ownership and operation, various components of social forestry have been grouped into two major components namely: farm forestry (owned and operated by a household) and community forestry (owned and operated by community). As the subject of social forestry is relatively new, in Chapter III, an attempt is made to provide a sound theoretical base by describing social forestry in a systems perspective. It has been argued that Duncan's (1959) "ecological complex" provides a sound theoretical base for social forestry. This is because the "POET" variables (Population, Organization, Environment, and Technology) with their interrelationships, have the greatest potential to explain an interdisciplinary field such as social forestry.

Social forestry can be initiated in a number of ways. Based on the literature search in social forestry and rural development, two approaches have been identified to implement forestry extension programs.

The diffusion process has been described as a framework for farm forestry, and social action has been discussed as a framework for community forestry adoption. The diffusion process mostly involves individual decision making while social action seeks a general consensus among the members of the community. By drawing concepts from the latter two processes a conceptual model was formulated for social forestry adoption in Chapter IV. In addition, in Chapter IV many important elements of forestry extension have been discussed which have bearing on social forestry adoption.

In order to achieve the stated objective of this study, two sets of data were necessary. Three interview schedules were designed to collect the required data. The first schedule was to collect data on households, and the second and third were to collect village level data. For various reasons, the study area was restricted to one district (West Godavari) in Andhra Pradesh state, India. Stratified sampling with a proportional allocation approach was followed to ensure the representativeness of villages in all four regions of the district. Systematic random sampling procedure was used to select the households within the villages. Experience in this type of research indicates that involvement of the local power structure and their legitimization is important for successful execution of field survey in rural areas. The data thus obtained were analyzed and presented in Chapter VI of this thesis.

The results of the household survey are discussed in Chapter VI. One of the stated objectives of the research project is to find the effect of various socio-economic, psychological, and communication factors of households on their levels of awareness, attitude and adoption of farm forestry. The correlation results presented in Table IV.1 indicate that all the above factors (except age, family type and family size) are positively related to their awareness, attitude and adoption levels. Selected independent variables were carried forward for multiple regression analysis, in order to determine the relative importance of each variable and the total variance explained by all variables. Three equations were developed with social forestry awareness, attitude, and adoption as dependent variables respectively.

In the first equation, all the variables put together explained 69 percent of variation (Table VI.2) in awareness. Orientation, media contact, social status, urban contact, change agent contact and attitude were found to be the determinants of an individual's awareness of social forestry. But income was not found to be a significant predictor of awareness. The regional differences in income levels, differential concentration of departmental activities, and program's incompatibility to the local farming systems are identified as strong reasons for the insignificant impact of income on awareness.

In the second equation, all the variables explained only 36 percent of variation in attitude (Table VI.2). According to diffusion research generalizations, it was expected that the researcher would find

significant effect of all variables on attitude. But only awareness, change agent contact and orientation were found to be significant determinants of an individual's attitude towards social forestry. The reason for this deviation may be that, unlike awareness levels, attitude levels are subject to fluctuations. They change based on an individual's experiences with social forestry innovations and change agents. This suggests that a study be undertaken on the attributes of innovation and the experiences of the social forestry adopters. Further, it is argued that attitude levels are influenced by traditions which differ largely from region to region.

In the third equation, all the variables together explained only 43 percent of variation (Table VI.2) in adoption. Although awareness and attitude were found to be significant determinants of adoption, it is the income of individual households that largely decides adoption. This may be due to the fact that tree planting involves a lot of risk and only rich households can afford to take those risks. This appears to be the common phenomenon in all the regions.

Analyzing the regional differences with respect to socio-economic, psychological and communication factors of households and their levels of program attributes is another objective of this study. It was expected that regions with higher averages of socio-economic, psychological, and communication characteristics would have higher levels of program attributes. But the data reported in Table VI.3, for Agency and Delta Regions are not consistent with that expectation. The Delta Region with higher averages of social status, income and media contact has the lowest average of adoption. On the contrary, the Agency Region, with lowest average of social status, income and media contact has a higher average of adoption than that of Delta Region. These differences were largely attributed to lack of location-specific programs and inappropriate extension strategies. However the data for both Upland and Coastal Regions supported the latter proposition.

The author wished to check the validity of the criticisms that the beneficiaries of the social forestry programs are largely rich and big farmers. One of the objectives of this study is to analyze the differences between adopters and non-adopters with respect to their socio-economic, psychological, and communication attributes and their levels of awareness and attitudes towards social forestry. The t-test results in Table VI.4 indicate that the adopters have higher averages of latter attributes compared with those of non-adopters. But the differences between home planters and non-adopters with respect to the above attributes are not significant. These results indicate that there is truth in the criticism but there is substantial scope for improving the situation by taking up target group specific programs.

Finding the relationship between structural and organizational factors of villages and their adoption of community forestry is another important objective of this study. Based on the theory of collective action or social action, the researcher expected to find an association between each of the village characteristics and the adoption of community forestry. But as shown in Table VI.5 none of the characteristics is associated with community forestry adoption. These findings and the discussion presented in Chapter II about the process of establishing communal plantations in the study area indicate that community forestry development is largely determined by the Forest Department. It appears that no social action process has taken place in establishing the communal plantation. This is the reason why many studies have criticized community forestry programs for remaining largely as governmental programs without ensuring the people's participation. The present approach of the Forest Department will undermine the self-help concept of rural organizations. While the literature on rural development emphasizes institution building to ensure effective local participation, it appears that social forestry organization has been unable to exploit the potential of the existing rural organizations.

To be successful any development program must ensure that the objectives of the change agency are consistent with those of the client system. In the Forest Department's view, making rural people self sufficient in fuelwood and fodder resources, restoring the ecological balance and providing rural employment are the primary objectives of social forestry. The study discovered (Table VI.12) that social forestry beneficiaries did not have the same objectives in their priority. Their main motive behind the tree planting is to gain economic returns. They want to use tree growing as an opportunity to add to their cash income by selling forestry products. They expect fuelwood only as a by-product from the trees they grow. This indicates that if the programs are designed without taking local needs and client priorities into consideration, they are quite unlikely to be acceptable to the people for whom they are designed. The study found that the respondents' main sources of information on social forestry is villagers. But the majority of the adopters utilized the outside sources of information. However in all technical matters of tree growing the majority of the adopters turned to their villagers. This is because the respondents grow mostly indigenous and locally desirable species.

The study also reported the people's concerns and problems in tree growing programs (Table VI.13). The majority (91 percent) of the respondents expressed concerns on the nature of the species grown and supplied by the department. They suggested that the department should consider the local needs and farming systems in planning nursery programs. About 50 percent of the respondents expressed their dissatisfaction over extension services. Analysis of these problems have implications in policy,

research, extension, resource support and market related areas of forestry development programs. Based on the suggestions of the respondents for improvement of social forestry programs it is indicated that consideration of these problems in designing or redesigning social forestry programs will increase their chances of success.

Organizationally the forest department has limitations. The foresters at the field level are not equipped with adequate training to work with people and communities. The number of forestry extension personnel is limited, therefore the size of their operational area is too large. They are assigned to various duties such as raising of seedlings, distribution of seedlings, maintenance of accounts, executing plantation works, etc. As a result they have very little time to do extension work. The research branch in social forestry organization is poorly developed so it is unable to assist the field level staff.

Recommendations

The data presented in Chapter VI explored many issues of concern to both the households and the villages in their adoption of social forestry programs. The Chapter also discussed a number of points related to social forestry programs. Based on the literature reviewed and the data analyzed, the following recommendations offer some alternatives for improving the social forestry programs.

1. A clear and well defined concept of social forestry is essential in designing forestry projects. The objectives of the program should be based on local needs and priorities.
2. Social forestry is part of the farming systems which differ from region to region. Therefore, incorporation of indigenous knowledge and local farming systems in designing the programs will increase their acceptability.
3. As the households' social, economic, psychological and communication attributes are influencing the adoption process of social forestry, target group specific extension programs have to be designed to ensure the participation of all sectors of the people.
4. Community forestry involves social action. It cannot be imposed from top-down but should be embraced by the community. Foresters should be the facilitators but not the main executors. They should work through local institutions.
5. To change the attitudes of people towards social forestry, foresters need to change their attitudes towards people to establish a working relationship with them. This requires adequate training for the field staff in social sciences particularly in extension.
6. A strong research and development branch is essential to assist the field staff on technical matters

and to coordinate training programs.

7. Social forestry is an inter-departmental program. More coordination is required between the social forestry department and other rural development departments.

Significance of the Study

Keeping in mind the assumptions and limitations of the study, the objectives of the research project were found to be fully achieved. The process, as well as the product of this research have important implications at theoretical, methodological and practical levels. The literature search conducted to provide a theoretical base for social forestry contributes significantly to currently limited published information. The conceptual model formulated for the adoption of social forestry provides a framework for designing forestry extension programs.

The study also has significance due to the specific approaches followed to collect required data. The legitimization of the study and establishment of a good working relationship between interviewers and respondents were emphasized. Therefore, the chapter describing the research procedure is written in considerable detail. It should be of definite interest and value to others conducting research in rural communities of Andhra Pradesh.

Finally the research project has a number of implications at a practical level. In applying the findings of this study, one should recall that it was conducted in one district in Andhra Pradesh (A.P). A.P. is a large state with different agro-climatic regions (Figure II.1) and various cultural settings. Therefore the data reported may not represent the entire state. However, the personal and professional experience of the researcher indicates that the findings of this study will be applicable to all the districts of Agro-climatic Region I, under which the study area falls. The data reported in Chapter VI will help the District Social Forestry Department in designing and redesigning its activities to suit the local situations and needs. The data reported can serve as a base line survey for further studies in order to measure the trends and changes in social forestry programs.

The fact that the researcher visited from a far off country (Canada) to the study area was important. It has raised the importance of people and their social institutions in the social forestry programs in the study area. It has also made a significant impact on forestry personnel in the district in changing their perceptions towards local people. The process of interviewing, fact finding, and mixing with people created a great deal of interest and enthusiasm among rural people.

Implications for Further Study

Although this study has addressed various issues in social forestry, it has raised a number of important issues that would warrant further study and investigation. The areas which require further research are indicated below.

1. Adoption of innovations is also influenced by the nature of innovation itself. Therefore research is needed on the attributes of social forestry to find out its applicability, acceptability and adoptability.
2. It is hard to generalize the findings with cross sectional studies particularly in the case of long term programs such as tree growing. Therefore, more longitudinal studies could be conducted to determine the social forestry adoption process.
3. Social forestry was described as an ecological complex. In this complex, change in one variable will have an impact on other variables. Therefore studies could be conducted on the impact of social forestry programs on population, environment and organizations.
4. More case studies on each type of adoption and adopter categories will provide insights on the specific problems and prospects of the program.
5. Although market related problems are few at this stage, it is important to conduct marketing studies for forestry crops at the present and in the future.

Concluding Statement

The purpose of the study was to analyze the factors affecting adoption of social forestry which have implications in forestry extension programs. The study rests on the assumption that sociological factors of households and villages, local needs and local farming systems would influence forestry development programs. The study has demonstrated that the latter factors vary from household to household and region to region. Therefore, it is not correct to follow a uniform approach without due regard to these variations. The value and usefulness of the findings of this study will depend upon the extent to which these aspects are considered in designing and redesigning social forestry programs.

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APPENDIX 1

INTERVIEW SCHEDULE 1

Questionnaire number _____

A STUDY OF FACTORS INFLUENCING THE ADOPTION OF SOCIAL FORESTRY IN WEST GODAVARI DISTRICT -ANDHRA PRADESH- INDIA

By

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For

Andhra Pradesh Social Forestry Project
Forest Department
Government of Andhra Pradesh

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NAMASTE! We are associated with Sri Janaki R. R. Alavalapati, a graduate student form the University of Alberta, Canada. He is studying the adoption process of Social Forestry in the villages of West Godavari District Andhra Pradesh, for his Master's thesis.

In this regard, we would be thankful to you if you can kindly spare your time to answer the questions which we ask. All your answer would be kept confidential.

(Interviewer should fill the following information)

Name of Village: _____
Name of the Mandal: _____
Door/House Number: _____
Interviewer's Name: _____
Time taken for interview: _____
Reasons for non interview (if applicable):
_____

1. (Interviewer should observe the type of respondents house and circle the appropriate number)

   Temporary ... 1
   Permanent ... 3
   Mixed ... 2

2. Who in your household generally makes the major decisions?

   _____

(Interview this person. It is permissible to have other members of the household present but people not of the household should not be present)

3. (Interviewer should record the sex of the respondent)

   Male ... 1
   Female ... 2

4. What is your age? (In years) _____

5. What is your caste? _____

6. What is your education?

   a) Illiterate 0
   b) Can read only 1
   c) Can read and write 2
   d) Primary school 3
   e) Middle school 4
   f) High school 5
   g) Intermediate 6
   h) Graduation and above 7

7. What is your occupation?

   a) Main occupation _____

   b) Subsidiary occupation _____

8. Is yours a nucleated of extended family? (Nucleated family means Wife, Husband, their children and parents)

a) Nucleated 1
b) Extended 2

9. How many members are there in your household? _____

10.	Name	Sex	Age	Relation	Education	Occupation
1.						
2.						
3.						
4.						
5.						
6.						

(N.B: If the number of family members exceeds 6 write on reverse of the face sheet)

11. Please tell me about the following material possessions.
Do you have

a) Cycle .. 1
Transistor .. 1
Radio .. 1
Chairs .. 1
Tables .. 1
Wrist Watch .. 1
Fan .. 1
Other (please specify) .. 1

b) Sofa .. 2
Almirah .. 2
Iron cots .. 2

c) Motor cycle/scooter .. 3
Television .. 3

d) Car .. 4
Jeep .. 4
Truck .. 4

e) Telephone .. 5

f) Any Other (please specify)

12. (Farm power) Please tell me whether you have the following

a) Wooden ploughs .. 1
b) Harrows .. 1
c) Hoes .. 1
d) Leveller .. 1
e) Sprayers/iron ploughs .. 2
f) Diesel/elect. motor .. 3

g) Bullock .. 4
h) Power tiller .. 5
i) Tractor .. 6
j) Any other (Please specify)

13. How many acres of agricultural land do the members of your household own?

Dry land _____ acres, wet land _____ acres, Total _____ acres

14. How many livestock do you have?

Livestock	Number
Bullocks	
Buffaloes	
She buffaloes	
Cows	
Goats	
Sheep	
Other (specify)	
Total	

15. What is the total annual income of all the members of your household from all sources? What is the total expenditure incurred on monthly consumption (only of food items) for all members of the household? (Interviewer should give some time to think and assist respondent in calculating amounts. Interviewer should deduct expenditure from the total annual income and record the balance amount)

Rupees: _____

16. We are interested to know about your participation in village/outside village clubs, associations, organizations or institutions. Those could be trade, political, professional, religious related. (Interviewer should give some examples such as youth clubs, Mahilamandals, Temple associations, labour groups, etc.)

16.A) Do you have membership in any of those organizations?
No.....0
Yes.....1 (If yes, go to 16.B)

16.B) In only one organization 1
In more than one organization 2

16.C) Do you hold any position in the organization
No.....0
Yes.....3

17. How often did you meet the following officials on your business during the last season?

S.No.	Officials[1] contacted	Very often (Once or more a week)	Often (Once in a month)	Occasionally (less than once a month)	Never
a)	V.D.O, V.A forester, or V.F.W	3	2	1	0
b)	A.A.O, Deputy ranger	3	2	1	0
c)	A.D.A, F.R.O	3	2	1	0
d)	M.D.O or other Mandal development officials	3	2	1	0
e)	D.D.A or D.F.O	3	2	1	0
f)	Any other (please specify)	3	2	1	0

18. How often do you participate in the following Mass-media source?

Mass media source	Nature of ownership	Extent of participation		
How often do you		(2)	(1)	(0)
a) Read newspapers	Subscriber...1 Non-subscriber...0	Daily	Occassio-nally	Never
b) Read farm/forestry Magazines, bulle-tins, etc.	Subscriber...1 Non-subscriber...0	Regu-larly	Occassio-nally	Never

1 V.D.O = Village Development Officer
F.R.O = Forest Range Officer
V.A = Village Aassistant
M.D.O = Mandal Development Officer
V.F.W = Village Forest Worker
D.D.A = Deputy Director of Agr.
A.A.O = Assistant Agriculture Officer
D.F.O = District Officer

Question 18 (Continued)

Mass media source	Nature of ownership	Extent of participation		
c) Read books on Agriculture/-forestry	Owner.....1 Borrower.....0	Regu-larly	Occassio-nally	Never
d) Listen to rural radio programmes	Owner.....1 Borrower.....0	Daily	Occassio-nally	Never
e) Watch television	Owner.....1 Borrower.....0	Daily	Occassio-nally	Never

19.A How many times did you visit the nearest town or city during last year?

a) more than once .. 7
b) Once in a week .. 6
c) Once in a fortnight .. 5
d) Once in a month .. 4
e) Once in three months .. 3
f) Half yearly .. 2
g) Yearly once .. 1
h) Never .. 0

19.B If you did what was the nature of your work?

a) On agriculture or forestry matters .. 2
b) Any other development programme affair .. 1
c) To buy groceries, etc. .. 0
d) For all the above purposes .. 3

20) I will read a list of activities that are concerned with Social Forestry /tree growing. Please tell whether you are aware of these activities. If you are, please tell us a bit more about each. (Interviewer should record brief details of respondent's awareness on each activity).

Activity/Programme	Yes	No	Tell a bit more
a) About tree nursery	1	2	_____
b) About "Vanamahotsava" celebrations	1	2	_____
c) About seedling distribution programme	1	2	_____
d) About forest worker/ any forest lectures/ suggestions	1	2	_____

Question 20 (Continued)

Activity/Programme	Yes	No	Tell a bit more
e) About tree patta programme	1	2	
f) About shelter belt plantations	1	2	
g) About communal land planting	1	2	
h) About road avenues canal bank/ railway	1	2	
i) About "Vanadarshini" (visits to nurseries and plantations) track plantations	1	2	
j) About District Social Forestry committee	1	2	
k) About field planting/ bund planting	1	2	
l) About House compound planting	1	2	
m) About any other (please specify)	1	2	

21. What was your source of information on the above activities? If you have more than one source you may say so.

Villagers	.. 1
Forest Officials	.. 2
V.D.O/V.A	.. 3
Mass Media	.. 4
Other (specify)	.. 5

22. We are interested about your attitude towards the following statements on Social Forestry/tree growing activities. Please tell me whether you strongly agree, agree, undecided, disagree, or strongly disagree over each statement

Statement	SA	A	UD	D	SD
1. Due to Social Forestry, the unemployment problem is going to be solved	1	2	3	4	5
2. Social Forestry Programme gives the opportunity to the farmers to develop rapport with officers of developmental departments	1	2	3	4	5
3. Forestry officials take less interest to develop rapport with rural people	1	2	3	4	5

4. Social Forestry Programme is not appropriate as it involves large amount of expenditure for government	1 2 3 4 5
5. Social Forestry is successful in every plantation along roadside	1 2 3 4 5
6. Till now, there is no progress noticed through social forestry programme in A.P.	1 2 3 4 5
7. Social Forestry helps in protection of agricultural crops from wind	1 2 3 4 5
8. In A.P., Social Forestry is not running well as the officials have no time to supervise the programme	1 2 3 4 5
9. There is little work done and more propaganda made about Social Forestry	1 2 3 4 5
10. Social Forestry program gave more opportunity for people's participation in planning developmental programs in agriculture	1 2 3 4 5
11. Social Forestry increases pressure on national forests	1 2 3 4 5
12. With introduction of social forestry program large number of farmers became rich	1 2 3 4 5

---

23. I will read a few statements. Please tell me whether you agree or disagree with these

	AGREE	DISAGREE
a. To get more useful information about agriculture related activities, we should have frequent contacts with different sources of interest (institutions) of outside the village.	1	2
b. Most of the information on agriculture/ home related activities can be had at the village rather than going outside the village	1	2
c. Adoption of new farm/home practices will certainly give higher returns and better health	1	2
d. Prospects of agriculture/home life are predetermined and God's will is the deciding factor	1	2
e. Households who manage their home/farm efficiently will have higher benefits and good family life whether god wishes or not	1	2
f. If one adopts new farm/home practices more problems will be involved, so there are more chances of loss	1	2
g. I propose to better the records of production/earnings of previous year	1	2

h. I am satisfied with the record of production/earning of the previous year 1 . 2

24. We are interested about your tree planting under Social Forestry. Did you ever make an attempt to grow trees of your own?

Yes.....1
No.....2 (If no, go to Q. 28)

25. What was your seeding source?

Private sources..... 1
Government sources..... 2
Both..... 3

26. Please tell me about your tree planting under each category, the extent, number planted and survival percentage. Please also tell us, when did you first attempt to grow trees in each category. (Please give time to think and calculate)

Planting Category	Extent (acres)	Number planted	Survival %	First tried (year)
a. In field	------	-----	------	-----
b. On farm bunds	------	-----	------	-----
C. In house compounds	------	-----	------	-----
d. Other (specify)	------	-----	------	-----

27. Please tell me, from where did you get the technical advice on the following matters

S.No. Subject	Sources				
	Offic-ials	Media	Fri-ends	Vill-agers	Others
1. On choice of species	1	2	3	4	5
2. On pit size.	1	2	3	4	5
3. On espacement	1	2	3	4	5
4. On fertilizer applic.	1	2	3	4	5
5. On watering	1	2	3	4	5
6. On Pest/disease cont.	1	2	3	4	5
7. On weeding	1	2	3	4	5
8. Other (specify)	1	2	3	4	5

28. Are you interested to grow trees this year?

Yes..... 1
No..... 2 (If no, go to 30.A)

29. Where do you want to grow trees?

1. _____
2. _____

30.A What are the main reasons for your growing of trees?
(Probe if necessary by saying: economic factors, for fuel/ fodder/small timber/fruits, love to grow trees, labour problem, etc.)

a) _____
b) _____
c) _____

30.B (Interviewer should ask this question if the response was NO for Q. 24 and 28).
What are your reasons for not growing trees?

Sufficient trees are there	.. 1
No land/space	.. 2
Results may not be good	.. 3
Protection problem	.. 4
Other crops better	.. 5
Do not know how to grow	.. 6
Other (Please specify)	.. 7

31.A Please let us know the problems you face are faced in adoption of Social Forestry/tree planting?

a) _____
b) _____
c) _____

31.B What are your suggestions to improve the Social Forestry/tree growing programme.

a) _____
b) _____
c) _____

32. What is the main fuel for cooking in your home? (Firewood, Kerosene, Electricity, Biogas, other)

1. _____
2. _____
3. _____

(If the answer is firewood go to Q. 33, otherwise go to Q. 34)

33. How do you procure your required firewood?

1. You depend on forests?	.. 1
2. You make dung cakes	.. 2
3. You purchase wood	.. 3
4. You collect agriculture residues	.. 4
5. You collect roadside brushwood	.. 5
6. Other (Please specify)	.. 6

34. If you have only livestock, please answer the following.

A. What is the fodder position of your household?

You have more than enough	.. 1
You have enough	.. 2
You do not have enough	.. 3
There is high scarcity	.. 4

B. How do you mainly feed your cattle?

Take the cattle out	.. 1
Leave the cattle out	.. 2
Stall feeding	.. 3

C. What is your main fodder source?

Buying	.. 1
Collect from own land	.. 2
Collect form village lands	.. 3
Collect from forest lands	.. 4
Collect from others lands	.. 5

TIIANK YOU

APPENDIX 2
INTERVIEW SCHEDULE 2

(Interview the forester in charge of the village)

Village: _____
Mandal: _____
Interviewer name: _____
Time taken for interview: _____Hrs. _____Min.

1. What is your age _____ years
2. Qualifications _____
3. Your experience in Social Forestry _____

4. Did you undergo training in Social Forestry? (If yes, specify the training)

   Yes..... 1
   No..... 2

   a) _____
   b) _____

5. Since how long you are serving in this place of posting?

   _____

6. We would like to know about the community forestry plantations of this village. Please tell me the extent of plantations raised, survival percentage and the year first raised under each category. (Give time forester to peruse records for answers)

Category Raised	Raised	Not raised	Extent	Survival %	year 1st raised
a. Village wood lots					
b. Road ave. plantations					
c. Canal Bank plantations					
d. Railway track plantation					
e. Institutions plantations					
f. Shelter belt plantations					
g. Other (Please specify)					

7. Do you have any tree nursery program in this village?

Yes..... 1
No..... 2

7.B If Yes, in which year it was first started? _____

8. What is the distance of your headquarters from this village?
   _____ Kms.

9. How often do you visit this village on your business?

Once or more in a week	.. 1
Once in two weeks	.. 2
Once in two weeks	.. 3
Once in a month	.. 4
Once in two months	.. 5
Once in six months	.. 6
Yearly once	.. 7
Never	.. 8

10. What is your mode of transport? _____

11. How many villages are there in your jurisdiction? _____

12. How many households you know in this village by their first name?

_____

13. How much percentage of households do you think grow trees?

_____

14. How do you rate the success of Social Forestry for this village?

_____

15. What are your main difficulties in implementing the Social Forestry programme in this village?

a. _____
b. _____
c. _____

16. What do you suggest for better progress of Social Forestry programme?

a. _____
b. _____
c. _____

17.A Do you have sufficient extension material to educate the public?

Yes 1
No 2

17.B What are the materials you mostly use in your extension?

1. _____
2. _____
3. _____
4. _____
5. _____

18. Please tell me your opinion in solving the technical problems of respondents in their tree growing.

	Unable to solve	Able to solve	Depend on officials	Better to have research wing
a. About species selection	1	2	3	4
b. About fertilizer applic.	1	2	3	4
c. About espacement	1	2	3	4
d. About yields details	1	2	3	4
e. About disease control	1	2	3	4
f. Other (Specify)	1	2	3	4

THANK YOU

APPENDIX 3
INTERVIEW SCHEDULE 3

(Interview the Village Assistant)

Village: _____
Mandal: _____
Interviewer name: _____
Time taken for interview: _____ Hrs. _____ Min.

1. Please tell me some details of this village

A. 1) What is the village population as per 1981 census?____
2) How many households are there in the village? _____
3) What is the population of scheduled caste? _____
4) What is the population of scheduled tribe? _____
5) What is the population of backward classes? _____
6) What is the population of other classes? _____

B. 1) What is the number of landless households? _____
2) What is the number of small and marginal farmers households? _____
3) What is the number of big farmer households? _____

C. How many castes exist in this village? _____

3. What is the literacy percentage?

Male _____%
Female _____%

4. What is the distance of nearest railway station for this village?_____ Kms.

5. What is the distance of nearest bus stop for this village?_____ Kms.

6. What is the distance of nearest town from this village?_____Kms.

7. What is the distance of nearest daily market place from this village?_____ Kms.

8. I am interested in listing all the clubs; associations, organizations and institutions of this village. They may be both formal and non-formal; those could be trade, communications, political, religious, or any other developmental in nature. Against each organization, please tell me since how many years is it functioning.

Health
1. _____
2. _____
3. _____
Education
1. _____
2. _____
3. _____
Trade
1. _____
2. _____
3. _____
Communication
1. _____
2. _____
3. _____

Development
1. _____
2. _____
3. _____

Political
1. _____
2. _____
3. _____

Religious
1. _____
2. _____
3. _____

Others
1. _____
2. _____
3. _____

THANK YOU

APPENDIX 4

SOCIAL STATUS SCALE DEVELOPED BY TRIVEDI (1963) WITH SOME MODIFICATIONS

1. Type of the house

Items	Weight
1. Temporary house	1
2. Semi-permanent house	2
3. Permanent house	3

2. Caste of the Respondent

Caste ____	weight
1. Scheduled castes and Scheduled tribes	1
2. Lower Castes- Barber, Washermen, Mason, etc.	2
3. Artisan Castes- Kummari, Kammari, Carpenter, etc.	3
4. Upper Castes/Prestige Castes- Brahmins, Vaiysyas	5
5. Dominant Castes- Kamma, Kapu Velama, Reddy.	6

3. Respondent's Education

Education ____	Weight
1. Illiterates	0
2. Can read only	1
3. Can read and write	2
4. Primary school	3
5. Middle school	4
6. High school	5
7. Intermediate	6
8. Graduation and above	7

4. Occupation of the respondent

Occupation ____	Weight
1. Labor	1
2. Caste occupation	2
3. Business	3
4. Independent Profession	4
5. Cultivator	5
6. Service	6

5. Social participation of the respondent

Item ____	Weight
1. No membership in any organization 0	0
2. Membership in one organization 1	1
3. Membership in more than one organization 2	2
4. Executive position in organization 3	3

6. Material possession of the respondent

Items	Weight
1. Cycle, Radio, Chair, Table, Wrist Watch, and fan	1 for each item
2. Sofa, Almirah, Iron cot	2 for each item
3. Motor Cycle, Scooter, Television	3 for each item
4. Car, jeep, truck etc.	4 for each item
5. Telephone	5 for each item

7. Farm power of the respondent

Items	Weight
1. Wooden ploughs, Hoe, spades pickax etc.	1 for each item
2. Sprayers, Iron ploughs, leveler	2 for each item
3. Diesel engine, Electric motor	3 for each item
4. Power tiller	4 for each item
5. Tractor	5 for each item

8. Respondent's possession of land

Extent of land	Weight
1. No land	0
2. Up to one acre	1
3. Up to 5 acres	2
4. Up to 10 acres	3
5. Up to 15 acres	4
6. Up to 20 acres	5
7. Above 20 acres	6

APPENDIX 5

SOCIAL FORESTRY AWARENESS SCALE

Item	Frequency of Judges for each weight			Weight fixed for analysis
	1	2	3	
a) About tree nursery	5	20	0	2
b) About "Vanamahotsava" celebrations	0	3	22	3
c) About seedling distribution programme	25	0	0	1
d) About forest worker/ any forest lectures/ suggestions	6	15	4	2
e) About tree patta programme	2	5	18	3
f) About shelter belt plantations	3	20	2	2
g) About communal land planting	3	19	1	2
h) About road avenues canal bank/ railway	22	3	0	1
i) About "Vanadarshini" (visits to nurseries and plantations) track plantations	0	2	23	3
j) About District Social Forestry committee	0	0	25	3
k) About field planting/ bund planting	24	1	0	1
l) About House compound planting	25	0	0	1

APPENDIX 6

ITEMWISE ANALYSIS OF SOCIAL FORESTRY AWARENESS FOR THE RESPONDENTS

(Figures are Expressed in Percentages)

STATEMENT	COASTAL REGION N=30	AGENCY REGION N=30	UPLAND REGION N=120	DELTA REGION N=180	OVERALL DISTRICT N=360
Knowing about					
Tree Nursery					
Yes	76.7	43.3	90.0	51.7	65.8
No	23.3	56.7	10.0	48.3	34.2
Vanamahotsava					
Yes	3.3	-	12.5	8.9	8.9
No	96.7	100.0	87.5	91.1	91.1
Seedling Distribution					
Yes	90.0	100.0	94.2	87.8	91.1
No	10.0	-	5.8	12.2	8.9
Foresters' Suggestions					
Yes	70.0	10.0	16.7	5.6	11.7
No	30.0	90.0	83.3	94.4	88.3
Tree Patta Programs					
Yes	66.7	30.0	34.2	27.8	33.3
No	33.3	70.0	65.8	72.2	66.7
Shelterbelt Plantation					
Yes	56.7	3.3	35.8	28.9	31.4
No	43.3	96.7	64.2	71.1	68.6
Community Planting					
Yes	73.3	43.3	49.2	56.1	54.2
No	26.7	56.7	50.8	43.9	45.8
Road/Canal/ Railway Plantings					
Yes	93.3	63.3	84.2	83.3	82.8
No	6.7	36.7	15.8	16.7	17.2
Vanadarshini					
Yes	10.0	-	5.8	3.3	4.4
No	90.0	100.0	94.2	96.7	95.6
SF Committees					
Yes	3.3	-	3.3	2.8	?
No	96.7	100.0	96.7	97.2	?
Farm Forestry					
Yes	100.0	100.0	97.5	100.0	99.2
No	-	-	2.5	-	2.8
Home Gardens					
Yes	96.7	100.0	0.8	99.4	99.2
No	3.3	-	99.2	0.6	0.8

APPENDIX 7

ITEMWISE ANALYSIS OF SOCIAL FORESTRY ATTITUDINAL STATEMENTS
(Figures are Expressed in Percentages)

STATEMENT	C.R N=29	A.R N=24	U.R N=94	D.R N=137	O.D N=284
Due to Social Forestry, the unemployment problem is going to be solved:					
Agree	86.7	88.4	86.7	78.5	82.8
Undecided	13.3	11.5	12.4	15.8	14.1
Disagree	-	-	1.0	5.7	3.1
Social Forestry Program gives the opportunity to the farmers to develop rapport with Officers of development departments:					
Agree	80.0	66.7	76.2	78.4	76.8
Undecided	20.0	29.6	19.0	17.6	19.4
Disagree	-	3.7	4.8	3.9	3.8
Forestry officials take less interest to develop rapport with rural people*:					
Agree	24.1	86.6	84.7	71.0	72.9
Undecided	10.3	3.3	6.3	11.6	8.9
Disagree	65.5	10.0	9.0	17.4	18.1
Social Forestry Program is not appropriate as it involves large amount of expenditure for government*:					
Agree	3.4	-	5.6	9.4	6.8
Undecided	31.0	30.8	37.0	23.6	29.6
Disagree	65.5	69.2	57.4	66.9	63.7
Social Forestry is successful in every plantation along road side:					
Agree	75.9	57.7	66.0	74.4	70.3
Undecided	17.2	26.9	20.2	10.9	15.9
Disagree	6.8	15.4	13.7	14.7	13.7
Till now there is no progress noticed through Social Forestry Program in A.P.*:					
Agree	17.2	25.9	28.8	39.4	32.9
Undecided	31.0	37.0	37.6	25.5	30.9
Disagree	51.7	37.0	33.7	35.0	36.3

Note: C.R.= Coastal Region; A.R.= Agency Region; U.P.= Upland Region; D.R.= Delta Region; O.D= Overall District.

* These are the negative statements. Therefore, "Agree" refers to unfavorable attitude whereas "Disagree" reveals favorable attitude.

APPENDIX 7 Continued

STATEMENT	C.R N=29	A.R N=24	U.R N=94	D.R N=137	O.D N=284
Social Forestry helps in protection of agricultural crops from wind:					
Agree	56.7	92.3	90.8	78.1	81.5
Undecided	13.3	7.7	7.4	11.9	10.2
Disagree	20.0	-	1.9	10.0	8.4
In A.P., Social Forestry is not running well as the officials have no time to supervise the program*:					
Agree	6.9	18.5	24.3	31.0	25.5
Undecided	41.4	14.8	36.4	36.1	34.9
Disagree	51.7	66.7	39.3	32.9	39.6
There is little work done and more propaganda made about Social Forestry*:					
Agree	41.3	37.9	56.8	69.6	61.5
Undecided	6.9	6.9	20.2	15.8	15.7
Disagree	51.7	55.2	22.9	14.6	22.8
Social Forestry Program gave more opportunity for people's participation in planning developmental programs in agriculture:					
Agree	73.4	32.0	52.6	58.7	56.0
Undecided	23.3	60.0	41.2	38.0	39.4
Disagree	3.3	8.0	6.2	3.3	4.6
Social Forestry increases pressure on national forests*:					
Agree	13.7	7.1	-	0.7	2.2
Undecided	37.9	7.1	25.2	32.5	28.3
Disagree	48.3	85.7	74.7	66.8	69.5
With introduction of social forestry program large number of farmers became rich:					
Agree	86.6	56.7	86.4	87.2	84.2
Undecided	6.7	13.3	4.3	2.3	4.3
Disagree	6.7	30.0	9.4	10.4	11.4

Note: C.R.= Coastal Region; A.R.= Agency Region; U.P.= Upland Region; D.R.= Delta Region; O.D= Overall District.

* These are the negative statements. Therefore, "Agree" refers to unfavorable attitude whereas "Disagree" reveals favorable attitude.

APPENDIX 8

RESPONDENTS REASONS FOR GROWING TREES

Economic Returns:

1. It is economically good.
2. For huge amounts at one time.

As an alternate Strategy:

1. I am thinking it is better than agriculture.
2. Because of shortage of labour.
3. It needs less supervision.
4. It is good for absentee landlords like me.
5. Agriculture has become expensive.
6. As this practice is new, good demand may be there (Market).
7. Commercial tree growing is remunerative.
8. It is better for landlords who are in profession other than cultivation.

To use Land Optimally:

1. Coconut and Casuarina home/bund planting, give good revenue and do not compete with agriculture.
2. Fruits and poles can be grown from home gardens, and we can get income out of them.
3. Agroforestry practices with cashew and coconut are more remunerative than pure agriculture.

Subsistence Needs:

1. For fuelwood.
2. For fodder.
3. For timber.
4. For fruits.
5. For self-sufficiency in fuel and fruits.

Environmental Benefits:

1. I love trees
2. To protect crops from winds.
3. For beauty.
4. Trees are good for health.
5. Tree growing is my tradition.
6. For shade.

As Future Security:

1. To perform the marriage of my sister/daugther (for dowry) it is an assured income after 5 years.
2. For the future of children.
3. As a security in old age.

APPENDIX 9

RESPONDENTS PROBLEMS IN ADOPTION OF SOCIAL FORESTRY

Resource Related:

1. Required plants are not available.
2. Fertilizers are not supplied.
3. There is no water to irrigate the plants.
4. Protection of plant from cattle is a big problem.
5. Protection from theft is a problem.

Program Related:

1. Plants are not distributed to the landless.
2. Plants are not supplied to the needy.
3. Required plants are not supplied sufficiently.
4. Seedlings are not distributed to weaker sections.
5. There is no seedling distribution program in this area so far.
6. When people are free officials do not distribute seedlings.
7. Difficult to make trips (for seedlings) because of cumbersome proceedings.
8. Needy plants have to buy.
9. Seedling distribution is not proper.
10. Forests officials grow seedlings without considering local farming systems and local needs.

Research related:

1. Pests and diseases are the problem.
2. In Eucalyptus some grow well but some do not. We do not know the reasons.
3. We are unable to get technical guidance for diseases and fertilizers.
4. We do not get suggestions on tree growing correctly from foresters.
5. Site specific species are not available in the nursery.

Extension Related:

1. Information of tree growing is not sufficient.
2. Poor cooperation from officials.
3. Very rarely we get chance to see the forest officials and ask suggestions.
4. We are not getting clear information on yield (from tree crop).
5. We get contradictory suggestions from agriculture and forest officials.

On Incentives:

1. Buying cost and transportation cost is a problem.
2. In summer, when watering is to be provided for plants, there would be no livelihood.
3. There are no subsidies/loans for tree growing.

Market Related:

1. Eucalyptus is not remunerative.
2. Suffered with loss by growing eucalyptus.
3. We are unable to get intermittent revenue with eucalyptus and other forest species (Bamboo).
4. Because of long term crops lot of risk is involved.
5. There is no market for eucalyptus.
6. There is uncertain about market opportunities for tree crops.

APPENDIX 10

RESPONDENTS SUGGESTIONS FOR IMPROVEMENT OF SOCIAL FORESTRY

Resource Related:

1. Both land and seedling should be given.
2. Sufficient number of seedling should be given.
3. Government should arrange for bore wells (for irrigation).
4. Government should provide water facilities.
5. Teak (Tectona grandis) seedlings should be supplied.
6. Fertilizers should be supplied.
7. Land should be given for tree planting.

Program Related:

1. Coconut seedlings should be given.
2. Needy species should be given.
3. Plants should be given to all castes and groups.
4. Fruit seedlings should be given more.
5. Seedlings should be given to every body.
6. Seedlings should be given to who has interest to grow.
7. Seedling distribution should be site specific/recommended after testing.
8. Eucalyptus should not be encouraged.
9. Government should give banana plants.
10. Mango and cashew seedlings should be given more.
11. Seedlings should be distributed immediately when rainy season begins.
12. Plants which give income should be given.
13. Seedling should be given through Panchayats.
14. Seedling distribution should be proper.
15. Injustice should be stopped in plants distribution.
16. Seedling distribution point should be nearer.
17. No caste or religion feeling should be there in seedling distribution.
18. Bag seedling of Casuarina should be supplied sufficiently.
19. For small and marginal farmers, and landless species suitable for bund planting and home planting, i.e. coconut and other should be given.
20. Seedlings should be grown (department) as per people's need and within easy reach, and also consult villagers before raising.
21. Department should have farm to sell the high yielding fruit species.
22. There should be a committee for tree planting in the Panchayat.
23. Should design a strategy for a assured supply of needy species.

Research Related:

1. Good quality seedling should be supplied.
2. Good seed should be supplied.
3. Eucalyptus should be encouraged only in lands where agriculture is not possible.
4. In delta regions for home and bund planting, coconut and Casuarina are the only best species.
5. In delta regions, there is less scope for shady species.
6. Local farming conditions should be kept in mind in raising species.
7. Mango, Cashew and Coconut are multipurpose trees and good for agroforestry, so they should be encouraged.

Extension Related:

1. Change agents should give suggestions as frequently as possible on tree growing.
2. People should be educated to have their responsibility in tree growing.
3. Should do more propaganda about tree planting.
4. Officials should have more contacts with people.
5. Officials contacts should be with all castes and all classes of people.
6. Officials should encourage more tree planting.
7. Change agents should ensure village elders cooperation.

8. A person should be there for each mandal to give suggestions on diseases.
9. People should be convinced about the economics of tree planting.
10. When you introduce new species, full details (on markets, etc.) should be given to people.
11. As we practice agroforestry, both agriculture and forest officials should combinedly give guidance.
12. We should have nursery for our own village.
13. Public should be educated about tree planting.
14. Village leaders and associations should be consulted on seedlings growing and distribution.
15. We should be trained to grow seedlings in nursery.

On Incentives:

1. Credit and loans should be provided.
2. Loans should be given to Eucalyptus growing farmers also.
3. Assistance should be given to fence the area of plantation.
4. Fruit seedling should be given free of cost.
5. Poor who grow trees should be given economic assistance.
6. Long term loans should be given for tree planting.
7. Subsidies or loans should be given to buy fertilizers and pesticides for tree growing.
8. Prizes should be awarded for better tree growers.

Market Related:

1. Government should assure market for tree crops.

APPENDIX 11

TYPES AND NUMBER OF SEEDLINGS GROWN IN WEST GODAVARI DISTRICT FOR PUBLIC DISTRIBUTION

Types of species	Number (millions)	Percentage
Fuel, Fodder and Small timber species	10.04	87.15
Shade and Ornamental Species	0.24	2.08
Fruit species	1.24	10.76

Appendix 12

Summary of Case Studies

Coastal Region

Name: Kadali Satyanarayana
Age: 40 years
Village: Mogaltur
Occupation: Cultivation and Tailoring
Caste: Settibalija
Education : High school
Possession of land: 5 acres dry land and 1.5 acres wet land

Mr.Satyanarayana said that casuarina and coconut tree growing is a traditional activity in that Region. He has been growing casuarina for the past 15 years. In the past (before Forest Department introduced social forestry programs) villagers used to plant bare root seedlings of casuarina. In 1986 he planted bag seedlings of casuarina in 1.5 acres of land. He found that bag seedlings of casuarina withstand transplanting shock better, survive better, and grow better when compared to the bare root seedlings. Further, he said, the bag seedlings of casuarina grow faster and can be harvested in four or five years. He said he does not now have to wait for six years to harvest the crop. During the first and second years he grew peanuts, brinjal, and sweet potato as an inter-crop. He said by comparing with paddy, casuarina growing is economically better. His perceptions on the economics of casuarina cultivation are as follows:

If paddy is grown on one acre 50 bags can be harvested (two crops per year). When the crop is sold 7000 rupees expected. The expenditure would be about 4000 rupees. Therefore the net profit would be 3000 rupees per year per acre. If casuarina is grown, it can be harvested in five years. About 40 tones of wood is expected per acre. At the rate of 500 rupees per ton, the revenue will be 20000 rupees per acre. The overall expenditure will be about 1000 rupees. The net profit would be 3800 per year. Further, after harvesting the crop, a minimum of 500 bundles of fuelwood is expected (from lops and tops of the trees) which can be sold at the rate of 3 rupees per bundle in the nearest town. He also says that as the standing crop is sold for the above price there will be no harvesting expenditure. Stump removal charges can be obtained by selling the stumps for charcoal burning.

Satyanarayana said that in that region even small and marginal farmers have started growing casuarina because it needs less supervision and few inputs. As inter-crop is possible for the first two years their livelihood is also not affected. From the third year onwards the family members can earn wage income as the crop needs very little attention. Banks are also giving 5000 rupees loans for casuarina cultivation which is an incentive to the small farmers.

Satyanarayana also said that in that area no body will grow trees for fuel and fodder purpose. They mainly grow trees to get substantial amounts to invest for creating durable assets (purchasing land, construction of a house), performing sisters'/daughters' marriage (substantial dowry has to be paid to the bridegrooms), or getting admission into professional colleges (huge amounts have to be paid as donations for admission into engineering and medical colleges fo example).

When asked about organizing committees and cooperatives within their village to raise the required number of seedlings and to market the crop, Satyanarayana said it is a good idea. If the forester initiates the idea villagers will happily accept. That way, he said, they do not have to depend on the department for supply of bag seedlings of casuarina.

Agency Region

Name: Darumudi Chinnabujji Dora
Age: 35 years
Village: Itikelakota
Occupation: Cultivation
Caste: Koya (Scheduled Tribe)
Education: Illiterate
Land Possession: 8 acres

Mr.Dora is an ITDA beneficiary. He planted cashew on his 2.5 acres of land in 1987 with financial assistance from ITDA. In 1987 and 1988 peanut was grown as an inter-crop in cashew garden. He said he can grow some agriculture crop in 1989 also. He has to wait for two years to start harvesting cashew. The harvest then can be continued for a period of about 45 to 50 years.

Mr.Dora obtained 200 cashew seedlings and 200 rupees from ITDA in 1987 (raising year). In the following year, 300 rupees was given to him in the form of wheat, clothes, and cash towards the maintenance of the plantation. He said because of this encouragement many farmers are willing to grow cashew on their lands. His perceptions of cashew economics are as follows:

When cashew starts yielding (from the fifth year) he expects a minimum of 4 bags (80 kilograms each) per acre. At 1000 rupees per bag, he expects 4000 rupees per acre. He said the cost on seed, fertilizers and pesticides will be about 1000 rupees per acre. The net profit will be 3000 rupees per acre per year from the sixth year onwards. He said that from agriculture crop he will not get more than 1500 rupees per acre per year. Further, expects firewood for his family consumption from cashew pruning. As cashew is not being broused by goats, he said there is not much protection problem. He said he learned that many small farmers in the Upland Region have grown cashew and are getting good profits. That is why he started growing the crop.

Mr. Dora said farmers in the Agency Region will not be interested in growing fuel, fodder, and small timber species. The reason is that they meet those requirements mostly from the near by forests. He said that at present ITDA is suppling seedlings. As these have to be transported from far off places most get damaged. Further, he said that due to delay in arranging the seedlings, the villagers are unable to utilize the advantage of the early monsoon showers. He said if the villagers are given assistance they can grow a nursery in their own village. In this way they do not have to wait for seedlings.

Upland Region

Name: Maddipati Ratnaji Rao
Age: 50 years
Village: Gopalapuram
Occupation: Cultivation
Caste: Kamma (Dominant caste)
Education : High school
Land possession: 14 acres of dry land and 2.75 acres of wet land.

Mr. Rao is the vice-president of the Gopalapuram panchayat. He got the message from the Forest Department that eucalyptus growing is remunerative and has a good market. He grew eucalyptus on 10 acres of his land in 1983 and harvested in 1988. He said his experiences in eucalyptus growing is very bad. From the beginning he faced a lot of problems. In his field some trees grew well but some did not. He could not get technical guidance from the officials. The yield was very disappointing. The details of his plantation are as follows:
Expenditure details:

Ploughing the area and planting tree seedlings	=5500 rupees
Pesticides and Fertilizers	=1800 rupees
Watchman wages	=4000 rupees
Total	13,300

In July 1988, he sold his crop to Kamalapuram Rayon factory at 370 rupees per ton. The total yield was only 160 tons of wood. The gross revenue was 59,200 rupees. The net profit per acre per year was calculated to be 918 rupees. He said that had he given the land for lease, he would have got 1500 rupees per acre per year. Further, he said that he needs at least 4500 rupees for stump removal to take any agriculture crop in that field. The department simply suggested to grow but did not pay attention on market problems. As the Forest Department supplies the raw material to the factories at cheaper rates, they pay lesser price for their produce. He said that he is not the only person who suffered with loss by growing eucalyptus but there are many in the Upland Region. Because of these problems, he said people who grew forestry species developed negative attitudes towards the Forest Department. In spite of this, he said the department is raising eucalyptus on large scale in their nurseries. He suggested that before introducing any idea or practice it should be adequately tested before being advertised. Otherwise the farmers will face a lot of problems.

Mr. Rao said that cashew has a good potential in the Upland Region. It is very economical and even small and marginal farmers also can afford to grow it. But the supply of cashew seedlings is limited by the Forest Department. He suggested that foresters should consider local farming practices and local needs in designing social forestry programs.

Delta Region

Name: K.V. Ramakrisna Raju
Age: 47 years
Village: Pedanindragolanu
Occupation: Cultivation
Caste: Kshatriya (Dominant Caste)
Education: Intermediate
Land possession: 22 acre of wet land

Mr. Raju is a progressive farmer in the village. He said coconut and casuarina growing is their traditional activity. He planted eucalyptus on four acres of land in 1983 after hearing the foresters' messages. He has not harvested his crop yet but he thinks he will get very poor yield from the eucalyptus crop. May be because of genetic problems, most of the seedlings did not grow well. He said he may get a net profit of 1500 rupees per acre per year. He said had he grown coconut or paddy he would have got a minimum of 3000 per year. He said that the officials should understand the local conditions and encourage the appropriate species. As the land is fertile people in that Region, practice agriculture in their fields and grow trees on bunds. He said there is tremendous scope for canal bund coconut planting in that region, but the department generally encourages fuel species. He said small farmers can not grow fuelwood crops because they can not wait for six years to harvest the crop. He said tree patta programs are very beneficial to the weaker section of the community because in that scheme coconut planting is encouraged.

Mr.Raju said that the department is not fully considering these local conditions in designing their nursery programs. For example, in the nursery raised nearby that village, has a lot of fuel, fodder, shade and ornamental, and small timber species. In that Region, generally nobody grows those seedlings.